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VIA CERTIFIED MAIL & EMAIL

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RE: Use of unreliable actuarial information in the claims administration of In Re: National Football League Players' Concussion Injury Litigation, No. 2:12-md- 02323 (the "Settlement") to the severe detriment and extreme prejudice of the Class Members

Dear Special Masters Pritchett and Verrier:

Our law firm represents approximately two hundred and fifty (250) Retired NFL Players in connection with their rights under the Settlement.

We are concerned and have reason to believe that unreliable actuarial information previously relied upon by the Parties to support a capped settlement, but never accepted by the Court, is being used in the administration of claims to the severe detriment and extreme prejudice of Class Members.

Specifically, we believe that the following actuarial reports are being used: (a) NFL Concussion Liability Forecast, prepared by Thomas Vasquez Ph.D., (ECF No. 6167), as amended (the "Vasquez Report")¹ and (b) Report of the Segal Group to Special Master Perry Golkin (ECF No. 6168) (the "Segal Group Report", together with the Vasquez Report, collectively, the "Actuarial Reports")².

¹ A true and correct copy of the Vasquez Report is attached hereto as Exhibit A; A true and correct copy of the Supplement to the Vasquez Report is attached hereto as Exhibit A-1

² A true and correct copy of the Segal Group Report is attached hereto as Exhibit B

BrownGreer PLC (“BrownGreer”) has informed the undersigned that they are relying on certain actuarial studies in the administration of claims, but declined to identify the studies being relied upon when asked. It should be noted that we in no way attribute any negative intent to either of BrownGreer or Co-Lead Class Counsel with respect to the matters raised herein.

As more fully set forth herein, the Actuarial Reports grossly underestimate and understate the statistical prevalence and extent of the neurocognitive injuries suffered by Retired NFL Players. This underestimation is highly inconsistent with the number and nature of meritorious claims present in the Class. The result is that the claims are made to look improbable. Unreliable information is causing inconsistency, the inconsistency is causing misplaced doubt. We are concerned that this inconsistency/improbability scheme is being used to deny meritorious claims on widespread scale. It is for this reason that reliance on these reports in the administration of claims will prejudice Class Members.

One immediate example of how the unreliable actuarial information is harming the Class Members is the practice of mass audits, which is depriving a large portion of the Class the bargained for timeline assured by the Settlement Agreement.³ BrownGreer relies on “data analytics” to determine if claims are statistically improbable and should therefore be subjected to an audit investigation. If the “data analytics” are based on unreliable actuarial reports that grossly underestimate the prevalence and seriousness of neurocognitive injuries suffered by Retired NFL Players, then many meritorious claims will unjustifiably be subjected to long, drawn-out audit investigations with no temporal limitations, putting the affected Retired NFL Players in limbo.

If the Actuarial Reports are to be believed, then there cannot be this many sick people now in the claims process, and they cannot be becoming sick this young. It is tragic that the victims of alleged deceptive practices by the NFL Parties, the Retired NFL Players, are being looked at with suspicion in a settlement that was supposed to help them.

Another impact of the Actuarial Reports is evident in that almost no dementia (i.e. Level 1.5 and Level 2 Neurocognitive Impairment) claims that have been paid. Over twenty thousand (20,000) claimants registered to participate in the Settlement, almost nobody has received a dollar for dementia. As of the March 5, 2018 Monetary Award Claims Report published by BrownGreer, of the one thousand and ninety-seven (1,097) dementia claims filed by Class Members, only six (6) have been paid to date!⁴ Many of these dementia claims were filed almost one (1) year ago as the claims submission process opened.

As more fully set forth herein, the Actuarial Reports are unreliable and grossly underestimate the prevalence and seriousness of neurocognitive injuries suffered by Retired NFL Players for the following reasons: (a) the conclusions in the Actuarial Reports were derived for the purpose of supporting the fairness of the rejected Capped Settlement (as defined herein), (b) the

³ See Response of the Lock Law Firm to the Expert Report of Professor William B. Rubenstein, ECF No. 9545, Page 8: “The NFL has sought **audits on nearly 50% of all submitted claims**, substantially delaying those claims and clogging the process so that non-audited claims are adversely affected.” [Emphasis added]

⁴ See Monetary Award Claims Report, dated as of March 5, 2018, published by BrownGreer.

Actuarial Reports have already proven materially false in several key respects and (c) the Actuarial Reports are based on problematic assumptions and questionable methodologies.

For the foregoing reasons, and as more fully set forth herein, we respectfully request that the Special Masters (a) instruct BrownGreer to disclose to Class Members the actuarial data that it is relying upon so that Class Members may review and scrutinize its accuracy, (b) order a review of such actuarial data by an independent, third party actuarial firm approved by the Special Masters, and (c) instruct BrownGreer to discontinue use of the Actuarial Reports, and any other actuarial information which has not been reviewed by an independent, third party.

I. The Conclusions in the Actuarial Reports were Prepared to Justify the Fairness of a Rejected Capped Settlement

The Reports should not be treated as fact. They were prepared by interested parties trying to justify a settlement rejected by the Court, but now are being proffered as objective science, which they are not. The manner and purpose for which the Actuarial Reports were produced cast doubt on the integrity and veracity of the conclusions of these reports. A brief history as to how and why these reports were developed is helpful to show that reliance on the Actuarial Reports in the current claims administration is unreasonable and highly detrimental to the Class Members.

On July 8, 2013, the Court directed the Parties to mediation before retired U.S. District Judge Layn Phillips.⁵ On August 29, 2013, less than two months after the Court directed mediation, Judge Phillips announced that the Parties had signed a term sheet incorporating the principal terms of a capped settlement (the “Capped Settlement”).⁶

There were many compelling reasons for settlement: (a) for the plaintiffs, the prospect of a protracted litigation, and defenses related to preemption of claims, statutes of limitation, causation and assumption of risk, and (b) for the NFL Parties, the Court’s rejection of their defenses leaving the claims largely in tact to be litigated in hundreds of trials in state and federal courts across the country, a myriad of theories of liability and a potential bottomless pit of liability.

Both the NFL Parties and the plaintiffs faced potential, significant hurdles if they elected to not settle, so they made a rational and conservative decision to settle. Once the total amount to be paid by the defendant was determined and fixed, then the Parties sought to prove the fairness of the Capped Settlement to the Court. In an attempt to do so, the Parties simply referred to unsubstantiated conclusions of economists and actuaries they had hired to justify their position that the \$760 million to be paid by the NFL Parties was sufficient to cover the benefits in the Capped Settlement, without providing any of the actual analysis of the “experts” to the Court.⁷

⁵ Order, July 8, 2013, ECF No. 5128.

⁶ See Memorandum, January 1, 2014, ECF No. 5657, 2-3

⁷ See Declaration of Mediator and Former United States District Court Judge Layn R. Phillips in Support of Preliminary Approval of Settlement, ¶20, ECF No. 5634-4

Luckily for the Class however, the Court rejected the Capped Settlement. The Court was primarily concerned that sufficient funds would not be available in a capped settlement to pay all valid claims.⁸ The Court stated specifically “the Monetary Award Fund may lack the necessary funds to pay Monetary Awards for Qualifying Diagnoses.”⁹ The Court noted that the lack of supporting evidence (i.e. the actuarial analysis that supports a capped settlement) raised concerns regarding the fairness, reasonableness and adequacy of the Capped Settlement, and denied the motion for preliminary approval of the Capped Settlement.¹⁰

What happened next can best be described as the proverbial fly in the ointment. The Court’s rejection of the Capped Settlement forced the Parties back to the negotiating table resulting in the uncapped Settlement we have today. The key difference between the Settlement and the Capped Settlement is that the NFL Parties agreed to remove the \$675 million cap on the Monetary Award Fund, and Class Counsel agreed to additional “fraud prevention measures.”

Since the only reason actuarial projections were referred to in the motion to approve the Capped Settlement was to justify the sufficiency of the \$675 million cap¹¹, their use was rendered moot and irrelevant the very moment the Parties agreed to an uncapped settlement. However, and presumably to induce the NFL Parties to enter into the uncapped Settlement, Class Counsel affirmed the confidence of the Parties in “the prior actuarial assumptions and projections”¹² in its motion for preliminary approval of the Settlement. **This is problematic, since by doing so an unofficial presumption as to the veracity of the conclusions of the actuarial projections and a de-facto cap on the Settlement were created.**

The conclusions of the Actuarial Reports were intended only to justify the sufficiency of the Capped Settlement, yet, to this day, the Actuarial Reports have been relied on for a wide variety

⁸ See Memorandum, January 14, 2014, ECF No. 5657

⁹ Id.

¹⁰ Id. at 11-12

¹¹ The Actuarial Reports confirm this point.

See Vasquez Report: “My analysis is designed to determine the total cost of resolving all pending and future claims by former National Football League (NFL) players alleging brain injury by concussive and sub-concussive impacts (concussion-related injuries). I was also asked to determine whether the **agreed upon settlement amount and timing of payments is sufficient** to meet all the obligations arising from these claims.” [Emphasis added], 3; “I understand that the funding for the Monetary Award Fund (MAF) totals **\$675 million** to be paid over the next 20 years.” [Emphasis added], 4.

See Segal Group Report: “The Settlement Agreement provides that the NFL Parties will pay **\$675 million** into the MAF...”, [Emphasis added], ¶14; “In order to evaluate **the sufficiency of the proposed Settlement**, we developed an actuarial model designed to project the prevalence of the Qualifying Diagnoses over the proposed 65-year term of the Settlement within the entire proposed class of retired NFL players...”, [Emphasis added], ¶15

¹² See Memorandum of Law in Support of Motion of Proposed Class Counsel for an Order..., 1 “Through this process, the Settling Parties became so confident in the prior actuarial assumptions and projections that an agreement to uncapped the amount of the Monetary Award Fund was reached in order to address the Court’s concern that all eligible Class Members over the 65-year lifespan of the deal would be compensated at the significant award levels for which the deal provided.”

of unintended purposes in the Settlement and claims administration process.¹³ These Actuarial Reports were not supposed to be used for other purposes and certainly were not supposed to be the universal, infallible measuring stick for the Class. There has never been an independent, third-party evaluation of the accuracy of the Actuarial Reports. These reports were prepared for use by interested parties to accomplish a specific purpose. They should not be treated as fact.

If the Actuarial Reports are treated as true then the Settlement is in fact a capped settlement. The practical effect of using the Actuarial Reports will be to label almost every claim as improbable, “red flag” them, audit them, then deny them under the pre-text of statistical improbability. The Class Members should be made aware of this and this information should be made public.

Reliance on the Actuarial Reports in the administration of claims explains the large number of audits that have presumably been triggered by “data analytics”.

II. The Actuarial Reports Have Already Proven Materially False in Several Key Respects

The Actuarial Reports have already proven materially false in several key respects which calls into question the validity of any assumptions, projections and conclusions made in the reports.

In the Vasquez Report, Mr. Vasquez states “[t]he participation rate in the Settlement Agreement among eligible former NFL players **is a significant factor** in determining the number of claims that will be filed and thus also the amount of funds required to resolve the claims.”¹⁴ [Emphasis added] He then later concludes that “approximately 60% of all potentially eligible former players will participate in the settlement.”¹⁵ Since Mr. Vasquez assumes that the total potential eligible population is approximately 21,070, his conclusion was that 12,642 (21,070 * 60%) Class Members would register.¹⁶ We now know that 17,125 Class Members actually timely registered.¹⁷ **He was incorrect by 4,483 Class Members!**

Similarly, the Segal Group Report grossly underestimated the participation rate of Class Members in the Settlement. The Segal Group Report assumes that the total potential eligible population is approximately 20,500¹⁸ and that 60%¹⁹ of them will register. In other words, they concluded that 12,300 (20,500 * 60%) Class Members would register. **They were incorrect by 4,825 Class Members!**

It has also become evident that the actual incidence rates of the terminal Qualifying Diagnosis (i.e. ALS, Parkinson’s and Death with CTE) were grossly underestimated by the Actuarial Reports.

¹³ Examples include, without limitation, the multitude of filings regarding the division of common benefit fees, a proposed limit on individually retained attorney fees and a proposed hold-back of fees.

¹⁴ Vasquez Report, 9

¹⁵ Id. at 10

¹⁶ Id. at 10, 14

¹⁷ See Summary of Registrations and Claims Submitted as of February 29, 2018, prepared by BrownGreer, 1

¹⁸ See Segal Group Report at ¶26

¹⁹ Id. at ¶41(e)

In the Vasquez Report, Mr. Vasquez projects that there will be a total of thirty-six (36) cases of ALS throughout the entire 65-year term of the settlement, and that only thirteen (13) of those claims will be made through the year 2020²⁰. However, just as of February 21, 2018, the first nine (9) months of the settlement, thirty-six (36) claims alleging ALS have already been filed and twenty-five (25) monetary award letters have already been issued.²¹ We're at the beginning of 2018 and nearly three (3) times as many ALS claims that were assumed by Mr. Vasquez to be filed through the **end of 2020** have already been filed, and nearly twice as many ALS claims that were assumed by Mr. Vasquez would be paid through the **end of 2020** have already been paid!

Similarly, the Segal Group grossly underestimated the prevalence of ALS amongst the Class Members. The Segal Group projects a total of thirty-one (31) cases of ALS throughout the entire 65-year term of the settlement.²² That is, they believed that throughout the 65-year term of the settlement, five less claims than have already been filed by Class Members nine (9) months into the process, would be filed.

It should come as no surprise that the Segal Group's projections are far more favorable to the NFL Parties, as the Segal Group are the hired "expert witnesses" of the NFL Parties. They were paid to be biased. In serving the interests of the NFL Parties, the Segal Group had enough foresight to omit exactly when those thirty-one (31) ALS claims would be made under the Settlement, and to leave the temporal distribution a mystery.

In the Vasquez Report, Mr. Vasquez projects that there will be a total of forty-six (46) cases of Death with CTE, and since Death with CTE is only covered for those who died prior to the Class Certification Order that all of these claims will be made through the end of 2020.²³ However, as of February 21, 2018, the first nine (9) months of the Settlement, seventy-eight (78) claims alleging Death with CTE have already been filed and fifty-six (56) monetary award letters have been issued.²⁴ We're at the beginning of 2018 and sixty-seven percent (67%) more Death with CTE claims than were assumed by Mr. Vasquez to be filed through the **end of 2020** have already been filed, and twenty-one percent (21%) more Death with CTE claims than were assumed by Mr. Vasquez would be paid through the **end of 2020** have already been paid!

Similarly, the Segal Group grossly underestimated the prevalence of Death with CTE amongst the Class Members. The Segal Group projects a total of fifty-two (52) cases of Death with

²⁰ Vasquez Report, 21-22

²¹ See Monetary Award Claims Report, dated as of February 19, 2018 (the "Claims Report") prepared by BrownGreer, 2, 7

²² Segal Group Report, ¶46

²³ Vasquez Report 22, 23

²⁴ Claims Report, 2, 7

CTE throughout the entire 65-year term of the settlement.²⁵ That is, they believed that throughout the 65-year term of the settlement, twenty-six (26) less claims than have already been filed by Class Members nine (9) months into the process, would be filed. The Segal Group's projection is deceptive in yet another way. The Segal Group projects that the average age of a Death with CTE claim will be 62.65²⁶ and that the average seasons played for the Class Members is two and one half (2.5) Eligible Seasons²⁷, which correlates to an average value of \$578,000 (\$1,156,000²⁸*50%); however the average value of the fifty-six (56) monetary award letters already issued is much higher at \$1,661,369.05 (\$93,036,667 ÷ 56). In sum, not only did the Segal Group grossly underestimate the actual number of Death with CTE claims, they also underestimated the value of those claims by a whopping two hundred and eighty seven percent (287%)²⁹.

In the Vasquez Report, Mr. Vasquez projects that there will be a total of twenty-five (25) cases of Parkinson's throughout the entire 65-year term of the settlement, and that only seven (7) of those claims will be made through the year 2020³⁰. However, as of February 21, 2018, the first nine (9) months of the settlement, eighty-six (86) claims alleging Parkinson's have already been filed and forty-two (42) monetary award letters have been issued.³¹ **We're at the beginning of 2018 and more than twelve times as many Parkinson's claims that were assumed by Mr. Vasquez to be filed through the end of 2020 have already been filed, and six times as many Parkinson's claims that were assumed by Mr. Vasquez would be paid through the end of 2020 have already been awarded! The conclusions of the Vasquez Report in this regard are not in the same solar system as the actual numbers.**

In the Segal Group Report, the Segal Group strategically bundles Parkinson's Disease, together with Alzheimer's Disease and Level 2 Neurocognitive Impairment³² in an obvious attempt to avoid transparency and protect their conclusions from scrutiny. The reality is that the assumptions and projections in the Segal Group Report would not withstand the most cursory inspection and analysis, so all effort was made to conceal as much as possible.

The above listed significant failures of the Actuarial Reports are sufficient to discredit the Actuarial Reports in their entirety. Projections and conclusions that are falling apart and proving

²⁵ Segal Group Report, ¶46

²⁶ See Id.

²⁷ Id.

²⁸ See Monetary Award Grid, issued by BrownGreer

²⁹ \$1,661,369.05 ÷ \$578,000 = 2.87434092

³⁰ Vasquez Report, 23

³¹ See Monetary Award Claims Report, dated as of February 19, 2018 (the "Claims Report") prepared by BrownGreer, 2, 7

³² See Segal Group Report, ¶46

materially and totally false only nine (9) months into the administration of a sixty-five (65) year settlement, should be discarded immediately or at best viewed as biased and unreliable, rather than relied upon as solid science.

There are two things to note: (a) in every instance where a projection is tested, it has failed, and (b) the conclusions and projections swing wildly to serve the NFL Parties to the severe detriment of the Class Members. **At what point will the conclusions and projections of reports that continuously and repeatedly prove to be materially false be discarded?**

III. The Actuarial Reports are Based on Problematic Assumptions and Questionable Methodologies

The assumptions and methodologies used in the Actuarial Reports serve to underestimate the prevalence and severity of Qualifying Diagnoses amongst the Class Members. While each of the Actuarial Reports has unique assumptions and methodologies that are problematic and questionable, and will be discussed in detail in this section, the common thread that makes both sets of results unreliable and inaccurate is the dependence of the Actuarial Reports on incidence rates of the medical conditions that constitute Qualifying Diagnoses in the general population³³, with a paltry increase in prevalence as a result of “concussions”. This is the overarching problem with how the data was analyzed.

a. The Vasquez Report

By using the general population instead of football players as a baseline to measure probably rates of neurological disease, artificially lower rates of incidence are expected. Comparison to incidence rates of the Qualifying Diagnoses in the general population is skewing the numbers. If we wanted to determine how many smokers will develop lung cancer, we wouldn't start by looking at lung cancer rates in the non-smoking population. That would make no sense. We would look only at the rates of lung cancer in smokers. However, that's what happened here with the Actuarial Reports. The foundation of both Actuarial Reports are the incidence rates of the medical conditions that constitute Qualifying Diagnoses in the general population. By using the wrong population group as the baseline, the expected incidence rates are much lower. Is it then such a surprise that the actual, true incidence rates of these diseases is much higher than predicted in the Actuarial Reports?

By starting with the prevalence of the diseases in the general population, then any assigned multiple among the specific population engaging in the risky behavior appears deceptively generous. As an example, if an expert were to say that a smoker is 500% (or 5 times) more likely to develop lung cancer than a non-smoker that would seem like a significant (and accurate) increase in risk for engaging in the risky behavior. However, despite the fact that it sounds reasonable, this statement would understate the risk significantly. We know that men who smoke

³³ See Vasquez Report, 18 and Segal Group Report, ¶41(b)

are 2,300% (or 23 times) more likely than never smokers, and women who smoke are 1,300% (or 13 times) more likely than never smokers, of developing lung cancer.³⁴

Yet, this is exactly what Mr. Vasquez has done in the Vasquez report. Mr. Vasquez concedes that “[r]esearch and literature concerning the potential incidence for the compensable diseases is limited”³⁵, yet he goes on to assume (based on this scant research) that Retired NFL Players who have suffered thousands or even tens of thousands of repeated hits to the head over an average of two (2) decades are only two (2) times more likely than any member of the general population (i.e. a nurse, a school teacher, an accountant, or just about anyone whose never played a contact sport in their lives) of developing Alzheimer’s disease, Parkinson’s or dementia.³⁶ Mr. Vasquez further assumes that the same Retired NFL Players are only 1.4 times more likely than a member of the general population of developing ALS.³⁷ Mr. Vasquez then concludes that the average age of diagnosis for Retired NFL Players is approximately seventy-seven (77) years old. In a nutshell, Retired NFL Players who suffer thousands of repeated head injuries over an average of two (2) decades are only 1.4 times (in the case of ALS) more likely and two (2) times (in the case of Parkinson’s, Alzheimer’s and dementia) more likely of diagnosis compared to the general population, and only at an age equal to one (1) year older than the average life expectancy for men in America³⁸.

This flawed methodology explains the significant and material errors we have already witnessed with respect to the projections in the Vasquez Report. It defies common sense to believe that the risks are this low, when the physical damage is so high and sustained for such a long period of time.

In building his assumptions Mr. Vasquez relies on research that is not relevant to the cohort of Retired NFL Players, discounts the findings to result in lower induced incidence rates of the Qualifying Diagnoses among Retired NFL Players and excludes multiple relevant studies that more accurately reflect the higher incidence rates of Qualifying Diagnoses among Retired NFL Players.

Mr. Vasquez is focused on the wrong problem – a single traumatic impact rather than repeated traumatic impacts. He relies heavily on research that falls into two categories: concussion research and single event traumatic brain injury research.³⁹ These are not the correct research areas

³⁴ See <http://www.lung.org/lung-health-and-diseases/lung-disease-lookup/lung-cancer/resource-library/lung-cancer-fact-sheet.html>

³⁵ Vasquez Report, 19

³⁶ Id.

³⁷ Id.

³⁸ The average life expectancy for American men in seventy-six (76) years old. See https://www.huffingtonpost.com/2013/11/21/us-life-expectancy-oecd_n_4317367.html

³⁹ See Vasquez Report, references on pages 44-47.

for Retired NFL Players. It is becoming more accepted among scientists that the leading cause of neurodegenerative diseases in NFL players is the cumulative effect of the repeated smaller hits to the head, as opposed to concussions at all.⁴⁰ In other words, concussions are a red herring. A concussion is a temporary condition immediately after a blow to the head. Conversely, what these football retirees are complaining of is long term and permanent disabilities, distinct from any transient concussions they may have suffered, some of which onset began years after the last blows to the head. By focusing on concussions Mr. Vasquez is not only relying on the wrong information, he is also introducing causation through the back door in a settlement where causation was specifically negotiated off the table.

Mr. Vasquez's reliance on research involving single events of traumatic brain injury is misguided because it focuses on an accidental single impact rather than a career of thousands of purposeful impacts intended to maximize violence. Retired NFL Players are part of a unique cohort of individuals that each suffer thousands of distinct mild to more violent brain impacts resulting in a chronic pattern of continuous brain injuries throughout their lives. They are physically gifted with extraordinary speed and strength. They are intensely trained with professional techniques honed over decades to hit hard with their heads, their primary tool of trade. Their careers and financial livelihoods then depend on the violence and effectiveness of their impacts, into other men who are also motivated, gifted and trained to hit in the opposite direction. There is no comparison of this cohort of Retired NFL Players with a studied cohort of individuals in the Netherlands who suffered a single traumatic brain injury (to cite a research study relied upon by Mr. Vasquez), and may or may not have developed dementia or Alzheimer's disease.⁴¹ But, this is exactly what Mr. Vasquez has done. Of the thirteen (13) total studies that Mr. Vasquez cited and relied upon, ten (10) of them studied the link between single events of traumatic brain injury in the cohort and the development of the applicable brain disease. It is only logical that a person who suffered many,

With respect to Alzheimer's Disease, 1 study looked at the link between concussion and cognitive impairment, 1 study looked at the neurodegenerative causes of death among NFL players (Lehman, Everett), and 5 studies were premised on single event head trauma.

With respect to ALS, 1 study looked at the neurodegenerative causes of death among NFL players (Lehman, Everett), 1 study looked at single event head trauma (together with cigarette smoking and APOE genotypes), and 1 study looked at ALS among Italian soccer players.

With respect to Dementia, 1 study looked at the neurodegenerative causes of death among NFL players (Lehman, Everett), 2 studies looked at single event head trauma, **and 1 study (Amen, Daniel) looked at playing football in the NFL and long term brain function but was excluded by Mr. Vasquez.**

With respect to Parkinson's Disease, 1 study looked at the neurodegenerative causes of death among NFL players (Lehman, Everett), and the remaining 3 studies looked at the link between single event head trauma.

⁴⁰ See https://www.washingtonpost.com/news/early-lead/wp/2018/01/18/a-new-study-shows-that-hits-to-the-head-not-concussions-cause-cte/?utm_term=.8cfe145a8220

⁴¹ See Vasquez Report, 46: Mr. Vasquez relies on a research study by K.M. Mehta. Et al., entitled "Head trauma and risk of dementia and Alzheimer's disease."

many thousands of impacts over decades is more likely to develop brain disease than a person who suffered a single head impact.

The sources that Mr. Vasquez relied upon are largely irrelevant here. However, even as Mr. Vasquez relies on these irrelevant sources, he provides no adequate explanation to explain why the multipliers (1.4 for ALS, and 2.0 for Alzheimer's, Parkinson's and dementia) that he believes are applicable to Retired NFL Players are so much lower than the multipliers found in most of the studies. He doesn't show his work, or provide any reasoning for these particular conclusions.

Mr. Vasquez ignores the considerable research and relevant knowledge from Boston University. The various groups and research teams at Boston University have extensively studied and prepared numerous reports regarding the link between football and brain disease, which should form the foundation of any actuarial study regarding how many Retired NFL Players will develop compensable diseases under the Settlement. But, for some reason, the single most widely accepted and acclaimed research team on this subject matter is altogether ignored by Mr. Vasquez.

b. The Segal Group Report

The Segal Group Report (which was commissioned by and paid for by the NFL Parties) is a thinly veiled attempt at downplaying the true risks of playing contact football, and the high incidence of serious brain injury among Retired NFL Players. It's not a surprise that assumptions are fabricated as a way for the NFL Parties to escape liability for the majority of those who were harmed.

In order to prepare its assessment, the Segal Group received sample data from Co-Lead Class Counsel regarding 2,179 Retired NFL Players, "of whom 1,584 former players provided information regarding their level of cognitive impairment/diagnosis of conditions."⁴² This data set of 1,584 Retired NFL Players is hereafter referred to as the "Data Sample". The Segal Group's methodology was theoretically designed to extrapolate their findings within the Data Sample to the entire Class. However, after they received the Data Sample, they then first creatively "interpreted" the Data Sample to reflect a much lower prevalence of Qualifying Diagnosis within the Data Sample, and second applied nonsensical assumptions in the extrapolation of the Data Sample to the entire Class that further reduced the prevalence of Qualifying Diagnosis amongst the Class as a whole.

In measuring the number of Qualifying Diagnosis in the Data Sample the Segal Group Report starts by applying arbitrary criteria (that is not based on science or medicine, and does not conform with the parameters of the Qualifying Diagnoses under the Settlement Agreement) to the reported neurocognitive ailments.⁴³ As an example, any Retired NFL Player that has less than eight (8) diagnosed neurocognitive deficits is deemed by the Segal Group to not have a Qualifying

⁴² Segal Report, ¶27

⁴³ See Segal Report, ¶32 (Chart on Page 19); No medical or scientific reasoning is provided for the application of these arbitrary standards.

Diagnosis.⁴⁴ By applying this arbitrary bright line rule, and several others⁴⁵, the Segal Group hastily disqualifies eighty nine percent (89%) of the Data Sample.⁴⁶

What happens next can best be described as the Segal Group's attempt to have their cake and eat it to. As mentioned above, the Segal Group first artificially waters down the number of Retired NFL Players in the Data Sample that have a Qualifying Diagnosis, then as will be explained more fully below, they argue that the number of watered down Qualifying Diagnoses are overrepresented in the Data Sample and steep reductions must be applied when the Data Sample is extrapolated to the remaining Class Members.⁴⁷ It's a one-two punch. First, the Segal Group only accepts a fraction of the sick people in the Data Sample as sick enough. Second, the fraction that they accept as sick, are deemed proportionately far sicker than the remaining Class Members.

The foundation for their flawed reasoning that the Data Sample contains more Retired NFL Players with Qualifying Diagnoses than the remainder of the Class is based on two points: (a) first, that there were more "veteran" players in the Data Sample than in the Class as a whole, and (b) second, that there was a selection bias among the Retired NFL Players that were part of the Data Sample. Their reasoning is flawed for many reasons.

With respect to the point of overrepresented "veteran" players in the Data Sample, it is true that the Data Sample included slightly more Retired NFL Players that played five or more years, and fewer players that played less than three years. However, wouldn't this be a concession by the NFL Parties that there is a direct link between playing professional football in the National Football League and the serious brain injuries that are compensated under the Settlement? On the one hand, the NFL Parties vigorously argue that playing football in the NFL is safe and there is no causal link between playing football in the NFL and serious brain injury, and on the other hand they argue that Retired NFL Players that had shorter careers in the NFL are less likely to have serious brain injuries than Retired NFL Players that had longer careers in the NFL. Which one is it?

This line of reasoning is not only inherently inconsistent, it also fails to consider the history of head trauma of the Retired NFL Players. The elite athletes that play for the NFL begin their first day with many years of intense play history. They are already seasoned ball players. Most of these elite athletes start playing full contact football as young children, and play all the way through middle school, high school and then four years of college. In the aggregate and on average they typically accumulate almost two decades of repeated head injuries, consisting of tens of thousands

⁴⁴ Id.

⁴⁵ Other examples, without limitation, of the bright line rules applied by the Segal Group are: (a) only fifty percent (50%) of Retired NFL Players that have exactly eight (8) diagnosed neurocognitive deficits are considered to have a Qualifying Diagnosis; and (b) only fifty percent (50%) of Retired NFL Players that are labeled "Neuro-Cognitive Diagnosed" are considered to have a Qualifying Diagnosis. *See* Id.

⁴⁶ 1,417 of the 1,592 ($1,417 \div 1,592 = 89.0\%$) Class Members in the Data Sample are determined to not have a Qualifying Diagnosis. *See* Id., and also Id. at ¶36.

⁴⁷ *See* Id.

of hits to the head before they step foot on a football field for the NFL. Alea iacta est - the die has been cast. This was the argument the NFL Parties should have made in their own defense. But they didn't. They simply argued (and continue to publicly argue) that the game is safe and there is no causal link. In other words, "move along folks, nothing to see here."

The Segal Group then attempts to further support their assumption that Qualifying Diagnoses are more prevalent in the Data Sample than in the Class as a whole by assuming, without any supporting evidence whatsoever, that there was a strong self-selection bias to participate for Retired NFL Players with cognitive issues in the Data Sample. The Segal Group doesn't provide any evidence to support the veracity of this assumption. They simply cite their "theory" and assume that it is correct.

This is yet another attempt by the NFL Parties to mislead and deceive. It is well documented that there exists a "warrior culture" among players in the NFL⁴⁸. Retired NFL Players spend their whole lives in a culture where their bodies and health are sacrificed for acts of toughness and game-day outcomes. Because of this deeply engrained psychological predisposition, Retired NFL Players are less likely to complain about their physical and mental problems, to visit with health care providers or to participate in any litigation that has to do with these issues, which they mostly seek to ignore. In other words, they are less likely to self-select to participate in any thing that has to do with their health, particularly litigation. This is more compelling and truthful than the Segal Group's unsupported assumption regarding self-selection. If anything, the Data Sample likely reflects a proportionately smaller number of people that are sick compared to the Class, since those who chose to stay quiet likely have the greatest injuries because they "sucked it up" and continued to play while suffering the health effects of repeated blows to the head.

We now know that tackle football is not safe, and will more likely than not result in serious brain injuries at every level. This has been confirmed by serious medical studies by independent medical institutions, not "expert" witnesses that are paid to be the NFL Parties' mouth pieces. On July 25, 2017, the JAMA Network published the results of a landmark study (the most comprehensive study on chronic traumatic encephalopathy, hereafter "CTE"), which study found CTE neuropathologically diagnosed in one hundred seventy-seven (177) of two hundred two (202) deceased football players across level all levels.⁴⁹ In other words, eighty-seven percent (87%) of all players (whether they only played in high school, college or in the NFL) whose brains were tested had CTE. More startling, one hundred ten (110) of the one hundred eleven (111) brains of NFL retiree's tested (i.e. 99%) were positive for CTE.

⁴⁸ See <http://www.businessinsider.com/nfl-concussions-roger-goodell-sharon-chirban-2011-1>

⁴⁹ See Clinicopathological Evaluation of Chronic Traumatic Encephalopathy in Players of American Football, Jesse Mez, MD, MS; Daniel H. Daneshvar, MD, PhD; Patrick T. Kiernan; et al, July 25, 2017 (hereafter, the "JAMA Study").

<https://jamanetwork.com/journals/jama/fullarticle/2645104#166463773>

Even though CTE is not compensated under the Settlement, CTE is the smoking gun. As the JAMA Study found, the majority of college level and NFL retirees had severe CTE pathology, and of those ninety five percent (95%) had cognitive symptoms and **eighty five percent (85%) had signs of dementia**.⁵⁰ The NFL Parties would have us believe that these independent findings are wrong, and that the made-up, best guess of their bought and paid-for “expert” witnesses truly reflect how many **young men** have been permanently crippled by their multi-billion dollar a year business.

In a final attempt to play down the total liability of the NFL Parties under the Settlement the Segal Group makes several outlandish and laughable assumptions regarding the age of Retired NFL Players when they develop Qualifying Diagnosis. To start, they assume that the average life expectancy of Retired NFL Players is eighty-seven (87) years.⁵¹ In other words, they contend that Retired NFL Players who suffer thousands of repeated head injuries, take numerous pharmaceutical drugs at the insistence of coaches and trainers (without proper medical supervision), suffer from severe orthopedic injuries to the point of being rendered totally and permanently disabled, will on average live eleven (11) years longer than the average American man.

If this wasn’t enough, the Segal Group assumes that Retired NFL Players will be diagnosed with the Qualifying Diagnosis very late in life. They assume that approximately:

- 98% of Qualifying Diagnosis will be made after the age of 60;
- 97% of Qualifying Diagnosis will be made after the age of 65;
- 95% of Qualifying Diagnosis will be made after the age of 70;
- **94% of Qualifying Diagnosis will be made after the age of 75;**
- 90% of Qualifying Diagnosis will be made after the age of 80; and
- 85% of Qualifying Diagnosis will be made after the age of 85!⁵²

In other words, they assume that almost all (i.e. more than 94% of) Qualifying Diagnosis will be made at an age that is older than the average life expectancy of healthy American men. This is nonsense. Especially, since we know that most Retired NFL Players (i.e. more than 99%) likely have CTE, and that eighty five percent (85%) of those with severe CTE will have signs of dementia⁵³. The frontotemporal dementia that plagues Retired NFL Players is a young man’s disease. This has been made apparent in the vast number of cases where young men at all levels and ages (e.g. high school, college and professional) have been shown to have severe CTE.⁵⁴ A recent representative example, is Aaron Hernandez who had stage three CTE, which is severe, at the young age of twenty-seven (27).⁵⁵ Based on the results of the JAMA Report, since Mr.

⁵⁰ See Id.

⁵¹ See Segal Group Report, ¶41(c)(iii)

⁵² See Id. Chart.

⁵³ See JAMA Report.

⁵⁴ See Id.

⁵⁵ See https://www.washingtonpost.com/sports/aaron-hernandez-suffered-from-most-severe-cte-ever-found-in-a-person-his-age/2017/11/09/fa7cd204-c57b-11e7-afe9-4f60b5a6c4a0_story.html?utm_term=.f829fe51a44f

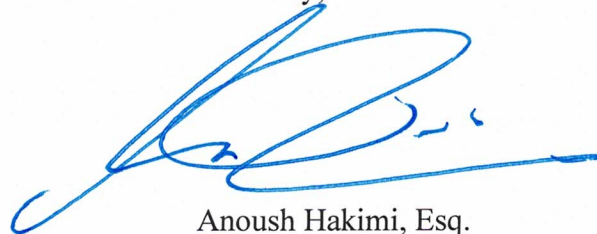
Hernandez had severe CTE there is an eighty-five percent (85%) chance that he displayed signs of dementia.

This truth however does not fit within the web of lies that the NFL Parties have sought to disseminate regarding the risks of football, or the NFL Parties' manipulations of the perception of BrownGreer and the Appeals Advisory Panel (the "AAP") regarding the prevalence of neurodegenerative diseases among young Retired NFL Players. Through the Segal Group Report the NFL Parties here attempt to convince BrownGreer and the members of the AAP that only few very, very old Retired NFL Players can possibly ever have a Qualifying Diagnosis, and that any Retired NFL Player who is young when he develops a Qualifying Diagnosis is simply faking it. After all, the numbers just don't add up, and the numbers can't be wrong, because they were prepared by "experts", albeit bought and paid for "experts."

Thousands of seriously injured men and their families are relying on the promised for benefits in the Settlement. Many of these men will parish while their legitimate claims languish under the specter of an audit investigation born of bogus statistics and projections. Many legitimate claims will be denied because BrownGreer and the AAP have been misled to believe that dementia and Alzheimer's disease will only affect Retired NFL Players in their 70's and 80's. As the Special Masters, your Honors are the entrusted guardians of the implementation of this Settlement, and ultimately the fate of these men and their families.

For the reasons set forth herein, we respectfully request that the Special Masters (a) instruct BrownGreer to disclose to Class Members the actuarial data that it is relying upon so that Class Members may review and scrutinize its accuracy, (b) order a review of such actuarial data by an independent, third party actuarial firm approved by the Special Masters, and (c) instruct BrownGreer to discontinue use of the Actuarial Reports, and any other actuarial information which has not been reviewed by an independent, third party.

Sincerely,



Anoush Hakimi, Esq.

Enc. Exhibits A, A-1 and B



Exhibit A

The Vasquez Report
(See attached)

**MATERIAL PROVIDED BY COUNSEL
TO THE PLAINTIFFS,
SEEGERWEISS LLP**

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NFL Concussion Liability Forecast

**Prepared by:
Thomas Vasquez Ph.D.
Analysis Research Planning Corporation
February 10, 2014**

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1. Introduction

On January 31, 2012, a federal multidistrict litigation was established in the United States District Court for the Eastern District of Pennsylvania, In re: National Football League Players' Concussion Injury Litigation, (MDL No. 2323). Additional similar lawsuits were also filed and are pending in various state and federal courts.

I was asked by representatives of the Plaintiff's Executive Committee in that litigation to undertake an analysis to assist in the settlement negotiations. My analysis is designed to determine the total cost of resolving all pending and future claims by former National Football League (NFL) players alleging brain injury caused by concussive and sub-concussive impacts (concussion-related injuries). I was also asked to determine whether the agreed upon settlement amount and timing of payments is sufficient to meet all the obligations arising from these claims.

This report presents the methodology and conclusions from my analysis.

2. Summary of Conclusions

As of the beginning of the 2013/2014 NFL season there were approximately 21,000 individuals who are former NFL players – approximately 19,400 who are still alive and 1,700 who are deceased.¹ Pursuant to the terms of the Settlement Agreement, upon approval of the settlement, all of these individuals will be eligible for payment following registration and submission of appropriate evidence of a qualifying diagnosis of a concussion-related injury and related claims information.

My primary conclusions are:

- 1.) Approximately 3,600 of the former players are estimated to develop compensable injuries and participate in the settlement with total compensation of approximately \$950 million. Because many of the injuries take years to develop, the compensation stream extends far into the future. Indeed, only approximately 54% of total compensation will be paid in the first 20 years of the operation of the settlement fund.
- 2.) The agreed upon level of funding (taking into account the earnings on the funds, the payout stream and the compensation scheme) is sufficient to pay all of the anticipated

¹ An estimated 3,300 former players have died since 1984. The Settlement Agreement, however, presumptively limits eligibility for monetary awards to the Representative Claimants of players who died on or after January 1, 2006. Approximately 800 deceased former players are eligible under this limitation. However, the analysis includes 900 players deceased from 2000 through 2005 based on a provision in the Settlement Agreement concerning statutes of limitation. The analysis of the former players who died from 2000 to 2005 is different from that concerning the former players who died after 2005, as explained herein.

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concussion-related claims. I understand that the funding for the Monetary Award Fund (MAF) totals \$675 million² to be paid over the next 20 years.

My conclusions are based on: (1) a compilation of the number of former players (both still alive and deceased) that are eligible to be class members which includes detailed information on their demographics, current compensable injury (if any) and NFL playing experience; (2) an in depth review of the medical literature and health statistics related to concussion-related injuries; (3) the application of a life cycle forecasting model that follows each individual player over time (applying epidemiological probabilities each year of the player's remaining life, the model determines whether and if so, when a player contracts a compensable injury), and; (4) estimates of the probability that the former players elect to participate in the settlement.

Certain estimates and assumptions are critical in forming my opinion. The following is a summary of the analysis supporting my two basic conclusions.

Total Compensable Claims and Compensation

Table 2-1 provides a summary of estimated compensable claims and total compensation by type of injury based on the compensable injuries defined in the Settlement Agreement.

Approximately 3,600 former players will receive payment. The overwhelming majority, approximately 15,000, are not compensated because they never contract a compensable disease. The remaining 2,300 do contract a compensable disease but based on evidence from other mass tort settlements, it is estimated that these eligible class members never elect to participate.

² The total settlement is \$750 million. However, \$75 million is earmarked for the Baseline Assessment Program (BAP), leaving \$675 million to pay compensation to class members.

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Table 2-1
Former Players with Compensable Concussion-Related Injury
by Type of Injury with Total Compensation
(\$ millions)

<u>Most Serious Injury/ Disease</u>	<u>Total Claims</u>		<u>Total Compensation</u>	
	<u>Count</u>	<u>Percent</u>	<u>Amount</u>	<u>Percent</u>
Compensable Injury/Disease				
ALS	18	0.5%	\$49.4	5.3%
Death w/CTE	46	1.3%	\$64.9	7.0%
Parkinson's	14	0.4%	\$3.2	0.3%
Alzheimer's	1,757	48.9%	\$474.9	50.9%
Level 2	1,761	49.0%	\$341.0	36.5%
Level 1.5	na	na	na	na
Total, Compensable	3,596	100.0%	\$933.4	100.0%
Not Compensated	17,474	na	na	na
Grand Total	21,070	na	\$933.4	100.0%

Note: All compensation categorized by most serious injury. All Level 1.5 claims are assumed to progress to Level 2 and more serious levels. \$248 million is paid to former players at Level 1.5. This amount is included in the category of their most serious disease as follows: \$212 million paid at Level 2; \$34 million to Alzheimer's and \$2 million to other disease types. Players are not compensated because they did not experience a compensable injury or did not file a claim.

The overwhelming percent of compensable claims and compensation is paid to former players with Alzheimer's disease or Level 2 neurocognitive disorders – 98% of compensable claims and 87% of compensation. The distribution of claims reflects the relative probabilities of the occurrence of the various diseases in the general population combined with the additional incidence related to concussions.

Timing of Compensation Payments and Funding

Table 2-2 shows the timing of payments to former players and the receipt of funding by the settlement fund through the payment of the last compensable claim. The timing and total amount of funding are sufficient to pay all claims.

- Compensation payments in the first five years are high because there are a relatively large number of former NFL players who have already indicated they intend to file a claim. These claimants include former players who have already been diagnosed with a

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compensable injury and will be paid in the first few years of the settlement fund. After these claims are resolved, the fund will be receiving and paying claims at a significantly lower rate, as the filing of future claims depends on the timing of the manifestation of future compensable injuries;

- The initial funding amount of approximately \$364 million (55% of the total funding) is designed to provide enough assets to pay the compensable claims already identified and to cover the startup costs of the claim processing facility while still leaving a significant asset. The remaining assets are supplemented with an additional \$311 million which is paid in annual installments through 2033. At that time, the remaining assets of the settlement fund (with earnings) are sufficient to pay all remaining claims.
- The Fund Balance increases through 2034 as the additional funding and earnings exceed the required amount to pay claims. The fund balance begins to decline after that as the settlement fund continues to pay claims, but with earnings as its only source of revenue - there is no additional funding contributed after 2033. The last claim is paid in the early 2080s at which time the fund is estimated to have a balance of approximately \$80 million.³

Table 2-2
Settlement Fund Compensation Payments, Funding and Earnings
Through the Payment of the Last Compensable Claim
(\$ millions)

Time Period	Compensation Amount ¹	Funding	Earnings	End of Period Fund Balance
2014 through 2018	\$292.3	\$364.0	\$25.0	\$91.6
2019 through 2023	\$78.2	\$103.7	\$28.1	\$143.8
2024 through 2028	\$95.5	\$103.7	\$38.6	\$189.0
2029 through 2038	\$178.6	\$103.7	\$103.2	\$214.0
2039 through 2048	\$167.7	\$0.0	\$72.9	\$116.2
Remaining 35 Years	\$133.3	\$0.0	\$103.4	\$80.4
Total	\$945.5	\$675.0	\$371.2	na

¹Includes processing Costs

Note: Funding plus earnings is actually slightly in excess of the amount needed to pay all claims.

³ The \$80 million balance in the early 2080s implies overfunding of only approximately \$5 million at 2014 levels.

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The Effect of Age, Years Played in the NFL and Inflation on Settlement Amounts

The Settlement Agreement provides maximum monetary awards to players who are less than 45 years old when they are diagnosed with a compensable disease and have played in the NFL for 5 years or more. There is a reduction in the compensation levels based on age and years played beginning with players age 45 or older and players with less than 5 years of experience in the NFL. The Settlement Agreement also provides for an escalation in the compensation amounts to adjust for inflation. These adjustments have a significant effect on the average amount of compensation paid to the former players and a corresponding significant effect on the total compensation paid by the fund.

The magnitude of the effect of age, playing time and inflation depends heavily on the average age of the players when contracting a compensable disease, the number of years the individual played in the NFL and the year the disease is contracted. Table 2-3 summarizes these variables.

The table shows that the average age for former players today is approximately 51 years of age and the average age at the time of diagnosis with the most serious disease is approximately 77 years of age for both groups. Of course, 77 years of age is simply an average. It is expected that many former players will develop compensable injuries at a much younger age. Due to the average age at the time of onset of the disease, compensation amounts are subject to significant reductions from the maximum awards.

Table 2-3 also shows that 60% of all players estimated to receive compensation have fewer than the 5 years needed to receive the maximum monetary award. It also shows that individuals who have already filed a claim have significantly more playing time than individuals who have not yet filed.⁴

- First, only 35% of the players who have already filed played fewer than 5 years. However, 73% of the players who have not yet filed played fewer than 5 years.
- In addition, those who have already filed played an average of 6.3 years. Those who have not yet filed played an average of only 3.5 years.

⁴ Throughout the report, a player is labeled a filer if he is currently represented by an attorney and has provided an indication the he will participate in the class. It does not necessarily mean the player has filed a law suit.

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Table 2-3
Selected Characteristics of Former Players:
Age, Years Played and Year of Contracting Disease/Injury

Player Category	Age At:		Years Played		Year of Most Serious Injury
	2014 or at Death	Year of Most Serious Injury	Percent of Players with Less Than 5 Years Played	Average Years Played	
Already Filed	52.0	76.3	35%	6.3	2037
Future Filer	51.2	77.7	73%	3.5	2039
All Filers	51.4	77.4	60%	4.4	2039

Table 2-4 shows the effect of these adjustments for age and years played. Without any adjustments, players would be compensated at the maximum value for their injury – shown in the table as the Maximum Monetary Award.

Table 2-4
Effect of Age, Years Played and Inflation on Average and Total Compensation
by Injury Category

Most Serious Injury/ Disease	Maximum Monetary Award	Value After Age Adjustment		Value After Age and Years Played Adjustment		Actual Final Value	
		Average Payment	Total Compensation (\$ millions)	Average Payment	Total Compensation (\$ millions)	Average Payment	Total Compensation (\$ millions)
Compensable Injury/Disease							
ALS	\$5,000,000	\$2,930,000	\$52.8	\$2,120,000	\$38.1	\$2,740,000	\$49.4
Death w/CTE	\$4,000,000	\$1,910,000	\$85.8	\$1,440,000	\$64.9	\$1,440,000	\$64.9
Parkinson's	\$3,500,000	\$320,000	\$4.5	\$190,000	\$2.7	\$230,000	\$3.2
Alzheimer's	\$3,500,000	\$340,000	\$593.8	\$190,000	\$340.7	\$270,000	\$474.9
Level 2	\$3,000,000	\$210,000	\$368.8	\$140,000	\$246.5	\$190,000	\$341.0
Level 1.5	\$1,500,000	na	na	na	na	na	na
Total, Compensable	na	na	\$1,105.7	na	\$693.0	na	\$933.4

Note: All Level 1.5 are assumed to progress to Level 2. All compensation categorized by most serious injury

Adjusting for age at diagnosis reduces the average compensation significantly below the maximum monetary award levels. The impact varies across injury types. For example, the average payment for diagnosed cases of ALS is \$2.93 million rather than the maximum award amount of \$5 million - a 40% reduction. The average age-adjusted payment for players being diagnosed with Alzheimer's is \$0.34 million, about 90% less than the maximum award amount of \$3.5 million.

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Adjusting for years played has a less substantial effect on award values after the age adjustment. For example as Table 2-4 shows, for former players diagnosed with ALS the average payment after the adjustment for number of years played is \$2.1 million – a 28% reduction. The average payment to players diagnosed with Alzheimer’s disease is reduced from \$0.34 million to \$0.19 million.

Finally, adjusting for inflation increases average and total compensation. Again, as Table 2-4 shows, adjusting for inflation increases average payments by approximately 30% for ALS and 40% for Alzheimer’s, 20% for Parkinson’s, no change for death with CTE and approximately 40% for Level 2 neurocognitive disorders. However, the actual final average award amounts for each disease are significantly below the maximum monetary award amounts, resulting in an inflation adjusted total compensation amount of \$933.4 million.

Player Participation Rates

The participation rate in the Settlement Agreement among eligible former NFL players is a significant factor in determining the number of claims that will be filed and thus also the amount of funds required to resolve the claims.

In order to establish an estimate of the participation rate, several factors were considered. First, experience with participation rates in other mass tort cases was reviewed. In general, participation rates in mass torts are dependent on the outreach and notice program, the lag from exposure/injury to the manifestation of a compensable disease/injury, and award size. For comparison, the participation rates for various large and widely publicized class action settlements and data on consumer product recall response rates were considered. The participation rates varied considerably, but centered in a range of 20% to 30%.

In this case, approximately 4,200 former players had already retained counsel and indicated a desire to participate at the time this analysis was prepared, which represents more than 20% of the potentially eligible population of approximately 21,100 former players.⁵ I understand that there has been for some time and continues to be extensive outreach to former players by plaintiff lawyers and others to participate. Whether continuing further efforts are likely to attract a significant number of additional players is not certain.

Nonetheless, it is assumed that the participation rates in this settlement will achieve high levels because the settlement has very high public visibility, and contact information available through the NFL Players union and other sources that can be used in the notification process is available for a large portion of the potentially eligible population. My forecast of the number of future claims and the resulting cash requirements to fund the settlement assumes that 50% of the living

⁵ Additional claims have been filed since this analysis was performed.

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and deceased⁶ former NFL players that have not yet filed will ultimately participate. When combined with those who have already filed, it is assumed that approximately 60% of all potentially eligible former players will participate in the settlement.

Inflation of Compensation Awards and the Earnings Rate of Settlement Assets

A key assumption in determining whether the settlement is adequately funded is the real rate of return earned on settlement assets. The calculations assume a 2.5% real rate of return – a 4.5% nominal yield and an underlying 2.0% inflation rate. The actual expected return is dependent on the real returns available for different types of assets and the portfolio mix adopted by the settlement administrators.

Long term historical experience suggests that a real rate of return of 2.5% is at the extreme lower level of expected returns. Returns on debt and equity both exceed 2.5% real rate of return over long periods of time. Indeed, even an extremely high reliance on low risk financial assets historically has yielded more than 2.5% annually. However, because of historically low bond yields in recent years, I conservatively assumed a 2.5% return.

Recent experience supports an average annual inflation rate of approximately 2.0% (especially since the Settlement Agreement caps the annual increase at 2.5%, thereby limiting the impact of any short term aberration). It should be noted that the adequacy of the settlement funds depends on the real rate of return, not the absolute level of the two components.

3. Methodology

The methodology used in this analysis is based on a life cycle forecasting model. The life cycle model looks at each individual in the population of former NFL players and “ages” them year-by-year into the future.

During the aging process, the life cycle model takes each of the former NFL players individually and first applies the epidemiological risk equations to compute the probability of contracting each one of the compensable injuries. The model then applies overall mortality rates to compute the likelihood of death due to other natural causes⁷. The mortality rates used to compute the likelihood of death due to natural causes are those for all causes for males in the same age group.

Thus, for each player and for each year, computations are made based on the probabilities of each of the following: (1) the player will die of natural causes, (2) he will be diagnosed with one of the compensable terminal diseases (Alzheimer’s, ALS, Parkinson’s, Death with CTE), (3) he

⁶ The participation rate for former players who were deceased before 2006 was reduced to 20%. This is because the settlement requires that pre-2006 deceased players must satisfy local statute of limitation conditions related to wrongful death claims and such requirement will preclude eligibility for most of these claims.

⁷ The term “natural causes” used throughout this report refers to any cause of death that is not identified as a compensable disease in the Settlement Agreement.

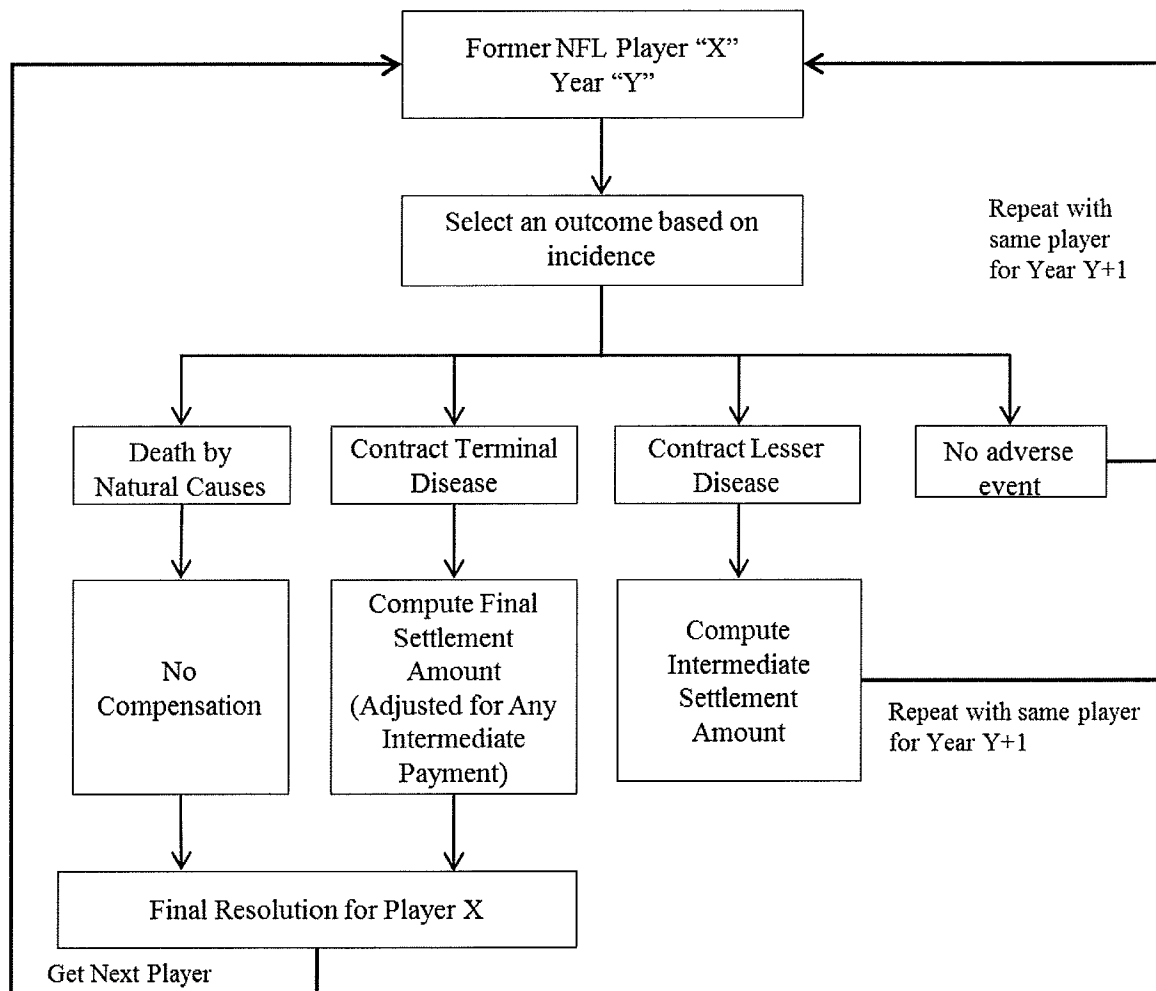
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will be diagnosed with one of the non-terminal neurocognitive disorders (Level 1.5 or 2), and (4) he will not experience any of these adverse conditions during that year.

These steps are repeated year-by-year, changing the mortality rates and disease incidence rates accordingly for age until the individual player reaches a final resolution – either he dies of natural causes or he is diagnosed with one of the terminal diseases and receives full final compensation. The model then repeats this entire process for the next player until all players in the population have reached the final resolution stage, and the last member of the population of former NFL players is no longer alive.

A diagram of the life cycle modeling methodology is shown in Table 3-1.

Table 3-1: Life Cycle Methodology Overview



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As the diagram shows, there are two possibilities for reaching a final resolution with a player: (1) when the model predicts that a player dies of natural causes he is removed from the eligible population either without compensation or with compensation for a non-terminal disease, or (2) when the model predicts that a player is diagnosed with one of the terminal diseases, a computation is made of the settlement amount due to him based on the disease, his age and the number of playing years. When the model predicts that a player is diagnosed with a neurocognitive disorder, he is assigned a Level 2 diagnosis. In every case where Level 2 is diagnosed, it is assumed that the player initially presented with a Level 1.5 disorder three years earlier. A computation is made of the settlement amount due to him based on condition, age and playing years as he progresses from Level 1.5 to Level 2, and that player is run through the model again repeatedly until his date and cause of death or terminal disease are determined with compensation calculated accordingly over time.

Once a player has been determined by the model to be diagnosed with a disease that is eligible for compensation, the computation of the settlement amount is made based on the compensation matrix. This matrix identifies a maximum value of compensation for each disease diagnosis, and then makes adjustments for certain factors that take into account background incidence and risk exposure such as the player's age at the time of the diagnosis and the number of years he played in the NFL.

There are 1,712 deceased former NFL players who may be eligible for compensation. This includes 76 players who have filed claims that include a qualifying diagnosis, and 1,636 non-filers who died between 2000 and 2013. In this analysis, for claims already filed that provided a qualifying diagnosis, this information was used to determine the amount of compensation due.

Deceased players for which no claim was filed but whose survivors are potentially eligible for compensation and deceased players who filed a claim but included no diagnosis information were also run through the life cycle forecasting model retrospectively in order to determine the likely date of diagnosis if any for a compensable disease. In order to forecast compensation that may be paid to these deceased players, the analysis does the following: (1) retains those cases in which death occurred between 2000 and 2013, (2) applies the same background and induced incidence rates used for eligible living former players to the deceased players retrospectively based on their age to determine a diagnosis date of a terminal or lesser disease, (3) applies the age discount (based on the estimated age at diagnosis) and the discount for years played, and (4) applies estimated participation rates.⁸

⁸ The participation rates for deceased players who have not filed a claim is the same as that used for eligible living players who have not filed (50%) based on the assumption that living family members or the player's estate may file a representative claim. For deceased players in this category who died prior to 2006, it is assumed that 20% of those who participate will be able to successfully demonstrate to the Claims Administrator that their claims are not time barred under the applicable statute of limitations, and thus establish their eligibility for compensation. For deceased claimants who have filed a claim and were diagnosed with a compensable disease the participation rate is 100%. For deceased claimants who did not provide a diagnosis, the participation rate is assumed to be 95%.

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The total compensation amount for all eligible former NFL players is determined by summing the compensation amounts for each player year-by-year.

The key inputs to the model are:

- Player data including age and years played in the NFL
- Background incidence for each of the compensable diseases
- Induced incidence from concussions for each of the compensable diseases
- Compensation amounts for each disease with adjustments for age and years played

Player data was derived from a combination of several authoritative sources. The sources, data, and methods used to identify the population of players who are potentially eligible for compensation are described in detail in section 4 of this report.

The incidence rates for each of the compensable diseases are determined by combining the background incidence rate for each disease with the induced incidence rate for each disease from concussion-related injuries. Because the compensable diseases have been the subject of numerous epidemiological studies, there is a reasonable amount of research available to effectively determine incidence rates by age. An extensive review of the available literature and research was conducted as part of this analysis to determine the incidence of each disease by age.

There is far less quantitative data available concerning the induced incidence of these diseases caused by concussive injuries. A review of the available research in this area, particularly with respect to football-related injuries and concussions, was undertaken. However, it was still necessary to make some assumptions regarding induced incidence rates.

The sources of data and assumptions that have been applied in the life cycle model to determine incidence rates are described in further detail in section 5 and Appendix A of this report.

The compensation amounts used in the analysis for each disease are based on the compensation matrix in the Settlement Agreement. These compensation amounts include adjustments for age at the date of diagnosis to account for background incidence and for years played in the NFL to account for risk exposure. A further description of the compensation amounts and the adjustment factors is presented in section 6 of this report.

4. Database of Former Players, Living and Deceased

Database of Former Players

An essential input for the analysis is a comprehensive database of information about the population of former NFL players who are eligible for the settlement. In this case extensive historical data are available from a variety of authoritative sources, and it has been possible to combine different databases to compile the relevant information for the entire population of

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former NFL players, including those still living and those that are deceased. The population of former NFL players was identified by combining information from four primary sources: (1) the database of NFL players who had already filed claims during the pre-settlement period,⁹ (2) the NFL player database owned and maintained by STATS, Inc.,¹⁰ (3) a database of former players provided by the NFL, and (4) a database of practice/development squad players also provided by the NFL. These four databases were merged, duplicate records were removed, and additional research and analysis was done to update deficient player records to produce the most complete list of former NFL players possible.

This analysis identified a total of 21,070 former NFL players who may be eligible for compensation. As shown in Table 4-1, this included 19,434 players who are currently alive or are deceased but have filed a claim, and 1,636 players who died between the years 2000 to 2013 but have not filed a claim.

Table 4-1
Former Players Potentially Eligible for Compensation

<u>Source</u>	<u>Count</u>
Living	
Database of players who filed claims ¹	4,207
NFL Database	13,340
STATS Database	1,349
NFL Practice/Development Squad Database	538
Subtotal	<u>19,434</u>
Deceased, 2000-2013	<u>1,636</u>
Grand Total	<u>21,070</u>

¹ This count includes 76 former NFL players who are deceased that have filed a claim.

In this analysis it has been assumed that former players, who were deceased in the period from 2000 to 2013, including those with a diagnosis of CTE, are eligible for compensation. Former

⁹ Since this analysis was completed additional claims have been filed by former NFL players and their representatives and claims continue to be filed. These players are included in the population used in the analysis and do not affect the outcome.

¹⁰ STATS Inc. is a service provider to the NFL that collects and maintains game and player statistics. STATS, Inc. is considered one of the leading sources of historical, current and real-time sports data and statistics.

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players who died prior to 2006 are not eligible under the Settlement Agreement absent a separate determination of eligibility.

The STATS and NFL databases include more data items than were needed for this analysis. The analysis makes use of variables such as age, date of birth, date of death, number of years played, and specific years played.

In merging the databases from the different sources, a number of issues were encountered:

- In the database of claims already filed, 206 of the records did not match to the NFL or STATS databases. Among these 40% provided no playing history. However, based on further research playing history was found for 17%. For 80% of the 206 cases, reference to the player's football experience was found through online sources. None of the unmatched cases were removed from the database.
- There were a total of 3,700 players included in the NFL database but not in the STATS database. Of these, 40% were practice players. Nearly all of the non-practice players had fewer than 2 seasons playing experience.
- Merging the three databases indicates that there may be an additional 1,349 eligible living inactive players. However, this count may be an overstatement for two reasons: (1) some STATS players may be deceased, but have no recorded date of death and, (2) some STATS players may be currently employed by the NFL.

There were also a number of issues encountered with respect to the deceased players in the databases. The STATS database included information for 5,930 deceased players dating as far back as 1925. The NFL database included only 1,617 deceased former players but it covered a shorter historical period. The NFL database contains player records only since 1980 while the STATS database includes some 2,286 records for players deceased prior to 1980. In the more recent period beginning in 2000, the STATS database includes 1,515 deceased player records compared to 981 in the NFL database. Merging, matching and de-duplicating the NFL, STATS and filed claims data sets identified a total of 1,636 non-filing deceased players who died in the period from 2000 to 2013.

Profile of Former NFL Players – Age and Eligible Seasons Played

The analysis examines the entire life cycle of each living former NFL player in the population in order to determine whether he will die of natural causes or be diagnosed with a compensable disease and when that will happen. Importantly, as discussed elsewhere in this report, the amount of any monetary award is highly dependent on the age of a player when he is diagnosed with a compensable disease and on the number of years he played in the NFL.

Table 4-2 below shows the current age profile of former players grouped into different categories – all players, non-filing players that are currently living, players that have already filed claims, and players that are deceased and no claim has been filed on their behalf. As this table shows,

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the average age of all players is 50.5 years, and 36% of all players are currently aged 55 or older. For those who are 55 or older, the age discount reduces the maximum award amount by approximately two-thirds (except in the rare cases of ALS).

Table 4-2
Profile of Former NFL Players by Age

Age	All Players		Living/Not Yet Filed		Already Filed		Deceased/Not Yet Filed	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Under 45	8,354	40%	6,744	44%	1,502	36%	108	7%
45 - 49	2,368	11%	1,831	12%	487	12%	50	3%
50 - 54	2,802	13%	2,095	14%	657	16%	50	3%
55 - 59	1,794	9%	1,261	8%	458	11%	75	5%
60 - 64	1,514	7%	1,026	7%	371	9%	117	7%
65 - 69	1,291	6%	824	5%	330	8%	137	8%
70 - 74	1,007	5%	604	4%	220	5%	183	11%
75 - 79	769	4%	419	3%	129	3%	221	14%
80+	1,171	6%	423	3%	53	1%	695	42%
Total	21,070	100%	15,227	100%	4,207	100%	1,636	100%
Average Age	50.5		47.9		51.0		73.3	

Table 4-3 below shows the profile of former players based on the number of years played in the NFL,¹¹ also grouped into the four different categories: all players, players who have not yet filed and are currently living, players that have already filed claims, and players that are deceased and no claim has been filed on their behalf. As this table shows, the average number of years played for all players is 4.1 years and 48% of all players played less than 3 years. For those who played less than 3 years, the years played discount reduces the maximum award amounts by 50% to 90%. The average number of years played for the 15,227 currently living players who have not yet filed was 3.4 years, which would result in a years-played discount of 40% on average from the maximum award amounts.

¹¹ The Settlement Agreement uses the concept of “eligible season” in determining whether to apply any discount. In the Settlement Agreement, an “eligible season” is a season in which the player was on the active roster for 3 or more regular season or postseason games, or on the practice squad roster for 8 or more games. The databases of former NFL players generally identified the calendar years that a player played. The analysis performed herein uses calendar years as the basis for determining the number of eligible seasons and therefore may overestimate the number of eligible seasons played.

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Table 4-3
Profile of Former NFL Players by Years Played

Years Played ¹	All Players		Living/Not Yet Filed		Already Filed		Deceased/Not Yet Filed	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
<1	2,247	11%	2,200	14%	39	1%	8	0%
1	5,041	24%	4,287	28%	238	6%	516	32%
2	2,719	13%	2,198	14%	321	8%	200	12%
3	1,940	9%	1,407	9%	392	9%	141	9%
4	1,564	7%	946	6%	476	11%	142	9%
5	1,366	6%	804	5%	443	11%	119	7%
6	1,232	6%	650	4%	477	11%	105	6%
7	965	5%	519	3%	357	8%	89	5%
8	889	4%	475	3%	340	8%	74	5%
9	802	4%	452	3%	289	7%	61	4%
10	679	3%	361	2%	271	6%	47	3%
>10	1,626	8%	928	6%	564	13%	134	8%
Total	21,070	100%	15,227	100%	4,207	100%	1,636	100%
Average Years Played	4.1		3.4		6.3		4.3	

¹Players who played an additional 0.5 years are included in the higher years played figure, e.g., a player who played 3.5 years is reported here as having played 4 years.

5. Incidence of Compensable Diseases

In order to forecast the timing and amount of monetary compensation that will be required to resolve the claims of former NFL players it is necessary to determine the incidence of compensable diseases for the population of former players over the lifetime of that population. This involves two steps:

- Determining the background incidence of the compensable diseases in the population. The background incidence represents the rate at which these diseases are expected to arise naturally in the population, including former NFL players.
- Determining the additional incidence of the compensable diseases that will arise in the population of former NFL players due to concussions – referred to as induced incidence or risk multiplier.

Compensable Injuries

The Settlement Agreement identifies 6 diagnostic categories as the compensable diseases:

- ALS

- Death with CTE¹²
- Parkinson's
- Alzheimer's
- Level 2 Neurocognitive Impairment¹³
- Level 1.5 Neurocognitive Impairment

For each of these diseases extensive review of the medical and scientific literature was performed to estimate the background and induced incidence rates.

The following sections describe the approach used to determine the background incidence, induced incidence and total incidence estimated for the population of former NFL players.

Background Incidence

To determine background incidence, this analysis has relied upon the best available published literature and research. A detailed description of the sources and methods used to determine background incidence is provided in Appendix A. The most severe diseases, referred to as terminal diseases, are defined in the Diagnostic and Statistical Manual -V (DSM-5) and the World Health Organization's International Classification of Diseases (9th and 10th editions) (ICD-9 and ICD-10). Because there has generally been extensive research and study of these diseases, information on background incidence rates (or prevalence rates) is reasonably available. As described in Appendix A, in order to arrive at a consistent measure and application of incidence rates, certain methods and assumptions were made including:

- Converting Prevalence to Incidence – in cases where only prevalence data were available, prevalence was converted to incidence.
- Extrapolating data for older age groups to younger ages – in cases where data were available only for specific older populations (*e.g.*, over age 65), the incidence was extrapolated to younger ages by defining the rate for 20-year-olds as 1/100th of the rate for 65-year-olds and increasing the rate through this age range by fitting an exponential curve.
- Exponential smoothing of data aggregated by age ranges – for diseases where data were provided only by age ranges, the incidence rate was assigned to the midpoint of the age range and extrapolated to each age by fitting an exponential curve.
- Adjustment for history of stroke – because Alzheimer's and neurocognitive disorders are sometimes attributed to a prior history of stroke, the incidence of these diseases was adjusted to account for this joint causality. According to epidemiological research, 9.1%

¹² Under the terms of the Settlement Agreement, only pre-settlement diagnoses of Death with CTE are eligible for compensation. Accordingly, the analysis does not forecast future cases of Death with CTE, and there is no corresponding induced incidence prospectively. Also, this analysis used confirmed cases of CTE.

¹³ Estimates of the incidence of Level 1.5 and Level 2 neurocognitive disorders were based on incidence for dementia as described in the methodology section of this report.

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of Alzheimer's patients and 8.4% of dementia patients had a history of stroke prior to the onset of these diseases. Since compensation to claimants who have a prior stroke history will be discounted by 75%, the overall incidence of Alzheimer's and dementia was adjusted to account for this instead of forecasting them separately. The incidence of Alzheimer's and dementia were reduced by an amount equal to 75% of the number of cases with joint causality (*i.e.*, 25% of those with a prior history of stroke are included in the background incidence).

- Adjustment for Traumatic Brain Injury (TBI) – The Settlement Agreement provides a 75 percent discount to monetary award amounts in cases where there has been a prior incident of TBI for all disease categories except ALS. This analysis did not assume any adjustments for prior incidence of TBI. Therefore to the extent that such cases occur, the analysis will tend to overestimate the total cost of monetary awards.

Induced Incidence

Research and literature concerning the potential increased incidence for the compensable diseases is limited, and some of it has historically been controversial. In this analysis peer-reviewed literature has been given priority, and controversial studies have been excluded. Studies of comparable sports injuries have also been relied upon. However, it was still necessary to develop and apply assumptions concerning the induced risk effect of concussions among former NFL players.

For Alzheimer's disease, Parkinson's and dementia, a risk multiple of 2.0 for ages 20 through 60 was used. After age 60, the risk multiple was assumed, based on available literature, to be more additive than multiplicative, and so the adjusted induced incidence is calculated as the background incidence at those ages, plus the incremental difference between the incidence rates at age 60 for each of the diseases. For ALS, a similar methodology was applied for the various ages, but using a multiplier for ages 20-60 of 1.4.

A detailed description of the sources and methods used to determine background incidence is provided in Appendix A.

Total Incidence

For each of the compensable diseases, the background incidence and induced incidence were combined to yield the total incidence among former NFL players. A summary of the incidence and counts of players for each compensable disease for the most serious injury/disease type is shown in Table 5-1 below. In cases where players contracted more than one type of injury, only the most serious injury is included here (*i.e.*, no double counting).

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Table 5-1
Estimated Total Incidence by Injury/Disease Type for Former NFL Players

Most Serious Injury/ Disease Type	Total Incidence - Background and Induced	
	Count	%
ALS	31	0.15%
Death w/CTE	46	0.22%
Parkinson's	24	0.11%
Alzheimer's	2,946	13.98%
Level 2	2,878	13.66%
Level 1.5	0	0.00%
Deceased, No Disease	15,145	71.88%
Total	21,070	100.00%

Note: All Level 1.5 are assumed to progress to Level 2, therefore the incidence count is the same for both impairment levels

As the table shows, taking into account both background and induced incidence, approximately 72% of the total population of former NFL players will die of natural causes unrelated to one of the compensable diseases. Of the 28% who it is estimated will be diagnosed with a compensable disease, 49% (2,878) will be diagnosed with Level 2 neurocognitive disorder as their most severe compensable disease. It is estimated that 3,047 former NFL players will be diagnosed with one of the severe terminal diseases – about 97% of those being diagnosed with Alzheimer's.

Total Incidence by Disease

To determine how the incidence of each of the compensable diseases will affect the cash flow requirements for claim resolution it is critical to know how many cases will be diagnosed each year and then to compute the discounts that would be applied to the compensation amount for the players' age and number of years played in the NFL. The life cycle forecasting model estimates this for each player and each year. The following tables summarize the incidence and provide averages of players' ages and years played for each disease. For each of these tables, the columns represent the following:

- Year of Diagnosis – the period of years for which the incidence data have been summarized.

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- Players Still Living – count of players who are alive at the beginning of the period. Over the course of each period, the count of players is reduced by the number who are deceased by any cause.
- Number Diagnosed – the number of players who will be diagnosed with that particular disease during the period (prior to application of participation rates).
- Percent Diagnosed – the percent of players still living at the beginning of the period who are diagnosed with the disease during the period.
- Average Age – the average age of the players who are diagnosed with the disease during the period.
- Average Years Played – the average number of years played in the NFL by the players diagnosed with the disease during the period.

Players may be diagnosed with more than one compensable injury/disease over time. For example, a former player may qualify for Level 2.0 and then contract Alzheimer's later in life. Most of the counts shown in the tables of this report include only the most severe compensable disease that a player contracts in his lifetime. In the example above, the player is counted only as contracting Alzheimer's in Table 5-1 even though he had a prior diagnosis of Level 2.0. However, compensation is paid at the time each disease is contracted. If the player is first diagnosed with a neurocognitive disorder and is then later diagnosed with an even more serious disease, he is paid at the time of the initial diagnosis and then he is paid again at the time of the more serious disease diagnosis. The second payment for the more serious disease diagnosis is a net amount that recognizes he had already received some compensation for his injuries.

Tables 5-2 through 5-7 show the incidence of all injuries. The same player discussed above who was only counted as having contracted Alzheimer's, will be counted twice in the examples below – once as he is eligible for Level 2.0 and again when he contracts Alzheimer's. This potential double counting means that the disease counts in Tables 5-2 through 5-7 exceed the counts in Table 5-1 and other tables in the report that count only the most serious injury.

Table 5-2 shows the estimated incidence of ALS by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 36 cases of ALS among former NFL players who have an average age of 60 and played an average of 4.3 years.

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Table 5-2
Total Incidence and Profile for ALS, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	6	0.03%	48.0	3.7
2006 - 2010	20,343	4	0.02%	50.8	8.3
2011 - 2020	19,699	3	0.02%	56.7	2.0
2021 - 2030	17,595	6	0.03%	48.8	5.6
2031 - 2040	14,501	6	0.04%	62.7	3.3
2041 - 2050	10,635	4	0.04%	69.8	2.4
2051 - 2060	6,632	5	0.08%	77.2	5.3
2061 - 2070	3,114	2	0.06%	82.5	2.3
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		36	0.17%	60.0	4.3

Table 5-3 shows the estimated incidence of Death with CTE and a profile of the average ages and years played for players diagnosed with this disease. In the case of Death with CTE, this analysis assumes that only those cases that had a confirmed diagnosis pre-settlement will be compensated. Therefore the model does not forecast any futures cases of CTE. As the table shows, there are 46 cases of Death with CTE among former NFL players who have an average age of 60.3 and have played an average of 7.9 years.

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Table 5-3
Total Incidence and Profile for Death with CTE, by Year

<u>Year of Diagnosis</u>	<u>Players Still Living</u>	<u>Number Diagnosed</u>	<u>Percent Diagnosed</u>	<u>Average Age</u>	<u>Average Years Played</u>
<2006	21,070	3	0.00%	44.0	11.3
2006 - 2010	20,343	18	0.00%	57.7	7.3
2011 - 2020	19,699	25	0.00%	64.1	8.0
2021 - 2030	17,595	0	0.00%	-	-
2031 - 2040	14,501	0	0.00%	-	-
2041 - 2050	10,635	0	0.00%	-	-
2051 - 2060	6,632	0	0.00%	-	-
2061 - 2070	3,114	0	0.00%	-	-
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		46	0.00%	60.3	7.9

Note: This analysis assumes that only those cases that had a confirmed diagnosis pre-settlement will be compensated. Therefore, no future cases of Death with CTE have been forecast for compensation.

Table 5-4 shows the estimated incidence of Parkinson's by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 25 cases of Parkinson's among former NFL players who have an average age of 75.5 and played an average of 4.9 years.

Table 5-4
Total Incidence and Profile for Parkinson's, by Year

<u>Year of Diagnosis</u>	<u>Players Still Living</u>	<u>Number Diagnosed</u>	<u>Percent Diagnosed</u>	<u>Average Age</u>	<u>Average Years Played</u>
<2006	21,070	1	0.00%	56.0	10.0
2006 - 2010	20,343	2	0.01%	78.5	6.0
2011 - 2020	19,699	4	0.02%	81.5	5.5
2021 - 2030	17,595	6	0.03%	71.3	5.3
2031 - 2040	14,501	3	0.02%	72.0	7.0
2041 - 2050	10,635	4	0.04%	80.3	3.9
2051 - 2060	6,632	3	0.05%	72.7	2.7
2061 - 2070	3,114	2	0.06%	83.0	1.3
2071 - 2080	850	0	0.00%	-	-
2081 +	67	0	0.00%	-	-
Total		25	0.12%	75.5	4.9

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Table 5-5 shows the estimated incidence of Alzheimer's by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 2,949 cases of Alzheimer's among former NFL players who have an average age of 77.9 and played an average of 4.1 years.

Table 5-5
Total Incidence and Profile for Alzheimer's, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	163	0.77%	73.6	3.7
2006 - 2010	20,343	48	0.24%	76.8	3.8
2011 - 2020	19,699	314	1.59%	72.7	5.0
2021 - 2030	17,595	431	2.45%	72.2	4.6
2031 - 2040	14,501	562	3.88%	75.9	4.3
2041 - 2050	10,635	556	5.23%	79.0	4.3
2051 - 2060	6,632	479	7.22%	82.1	3.9
2061 - 2070	3,114	296	9.51%	84.8	3.1
2071 - 2080	850	94	11.06%	90.1	2.1
2081 +	67	6	8.96%	95.7	1.3
Total		2,949	14.00%	77.9	4.1

Table 5-6 shows the estimated incidence of Level 2 neurocognitive disorders by multi-year periods and a profile of the average ages and years played for players diagnosed with this disease. As this table shows, there will be an estimated 3,354 cases of Level 2 disorders diagnosed among former NFL players who have an average age of 77.2 and played an average of 4.2 years. The incidence of neurocognitive disorders was estimated using data for the incidence of dementia as a proxy for Level 2 disorders. It was also further assumed that Level 2 disorders are progressive and every case would initially be diagnosed as a Level 1.5 disorder. In this analysis, incidence of dementia were treated as Level 2 disorders and then regressed backward by 3 years to determine the onset of the Level 1.5 disorder. The result of this can be seen in Table 5-7 where the number of diagnosed cases of Level 1.5 disorders is the same 3,354 as for Level 2.0, but the average age is 3 years younger at 74.2.

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Table 5-6
Total Incidence and Profile for Level 2, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	206	0.98%	74.5	3.5
2006 - 2010	20,343	71	0.35%	67.4	5.7
2011 - 2020	19,699	334	1.70%	73.6	5.2
2021 - 2030	17,595	541	3.07%	75.2	4.9
2031 - 2040	14,501	615	4.24%	75.3	4.3
2041 - 2050	10,635	648	6.09%	77.5	4.0
2051 - 2060	6,632	537	8.10%	80.1	4.1
2061 - 2070	3,114	325	10.44%	83.9	2.9
2071 - 2080	850	72	8.47%	88.3	1.9
2081 +	67	5	7.46%	95.8	1.4
Total		3,354	15.92%	77.2	4.2

Table 5-7
Total Incidence and Profile for Level 1.5, by Year

Year of Diagnosis	Players Still Living	Number Diagnosed	Percent Diagnosed	Average Age	Average Years Played
<2006	21,070	237	1.12%	70.7	3.8
2006 - 2010	20,343	71	0.35%	61.4	6.2
2011 - 2020	19,699	452	2.29%	71.9	5.0
2021 - 2030	17,595	571	3.25%	72.3	4.8
2031 - 2040	14,501	631	4.35%	72.7	4.3
2041 - 2050	10,635	638	6.00%	75.2	4.0
2051 - 2060	6,632	486	7.33%	78.2	3.7
2061 - 2070	3,114	230	7.39%	82.4	2.7
2071 - 2080	850	38	4.47%	87.2	1.4
2081 +	67	0	0.00%	-	-
Total		3,354	15.92%	74.2	4.2

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6. Compensation

Compensation of Living Former Players

The compensation amounts used in the analysis are found in Exhibit 3 to the Settlement Agreement. This Monetary Award Grid (Grid) is shown in Table 6-1 below. The Grid defines maximum amounts to be paid to former players based upon their diagnoses. These maximum amounts are then subject to adjustments based on two discount factors: (1) the player's age at the time of diagnosis, and (2) the number of years played in the NFL. These adjustment factors were considered appropriate to account for background incidence and exposure risk.

Players who are diagnosed with a compensable disease before the age of 45, and played in the NFL for 5 or more years are eligible for the maximum compensation amounts. Adjustments are made for each year above the age of 45, and there is a further reduction to the compensation amount for each half year of playing time less than 5 years.

Table 6-1 below shows the maximum amounts to be paid under the compensation matrix for each disease category at different age ranges.¹⁴

Table 6-1
Monetary Award Grid, by Age at Time of Qualifying Diagnosis

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	\$5,000,000	\$4,000,000	\$3,500,000	\$3,500,000	\$3,000,000	\$1,500,000
45 - 49	\$4,500,000	\$3,200,000	\$2,470,000	\$2,300,000	\$1,900,000	\$950,000
50 - 54	\$4,000,000	\$2,300,000	\$1,900,000	\$1,600,000	\$1,200,000	\$600,000
55 - 59	\$3,500,000	\$1,400,000	\$1,300,000	\$1,150,000	\$950,000	\$475,000
60 - 64	\$3,000,000	\$1,200,000	\$1,000,000	\$950,000	\$580,000	\$290,000
65 - 69	\$2,500,000	\$980,000	\$760,000	\$620,000	\$380,000	\$190,000
70 - 74	\$1,750,000	\$600,000	\$475,000	\$380,000	\$210,000	\$105,000
75 - 79	\$1,000,000	\$160,000	\$145,000	\$130,000	\$80,000	\$40,000
80+	\$300,000	\$50,000	\$50,000	\$50,000	\$50,000	\$25,000

Table 6-2 below shows the percentage discount applied to the compensation amounts based on the number of years played. This ranges from a zero percent discount for 5 or more playing

¹⁴ Table 6-1 shows average amounts over five year ranges. The actual award grid provides different amounts for each age from 45 to 80.

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years up to a 90 percent reduction in the payment amount for those who played 0.5 years or less.¹⁵

Table 6-2
Discounts to Monetary Awards for Years Played in the NFL

Years Played	Discount	All Players	
		Count	Percent
5+	0%	7,496	36%
4.5	10%	62	0%
4.0	20%	1,449	7%
3.5	30%	115	1%
3.0	40%	1,719	8%
2.5	50%	221	1%
2.0	60%	2,209	10%
1.5	70%	511	2%
1.0	80%	5,041	24%
0.5	90%	2,247	11%
Total		21,070	100%

The Effect of Age, Years Played in the NFL and Inflation on Settlement Amounts

The Settlement Agreement provides maximum monetary awards to players who are less than 45 years old when they are diagnosed with a compensable disease and have played in the NFL for 5 or more years. There is a reduction in the compensation levels based on age and years played beginning with players age 45 or older and players with less than 5 years of experience in the NFL. The Settlement Agreement also provides for an escalation in the compensation amounts to adjust for inflation. These adjustments have a significant effect on the average amount of compensation paid to the former players and a corresponding significant effect on the total compensation paid by the fund.

The magnitude of the effect of age, playing time and inflation depends heavily on the average age of the players when contracting a compensable disease, the number of years the individual played in the NFL and the year the disease is contracted. Table 6-3 summarizes these variables.

¹⁵ Players who played on practice squads were assigned 0.5 years of eligible playing time for each year on a practice squad. The Settlement Agreement applies a 97.5% reduction for players with no eligible seasons. I have assumed that all players have at least 0.5 years played.

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The table shows the average age at the time of diagnosis with the most serious disease is approximately 77 years of age for both groups. Therefore due to the average age at the time of onset of the disease, compensation amounts are subject to significant reductions from the maximum awards.

Table 6-3 also shows that 60% of all players estimated to receive compensation have fewer than the 5 years needed to receive the maximum monetary award. The years played variable shows that the players that have already filed have significantly more years played in the NFL than the future filers.

Table 6-3
Selected Characteristics of Former Players:
Age, Years Played and Year of Contracting Disease/Injury

Player Category	Age At:		Years Played		Year of Most Serious Injury
	2014 or at Death	Year of Most Serious Injury	Percent of Players with Less Than 5 Years Played		
			Average Years Played		
Already Filed	52.0	76.3	35%	6.3	2037
Future Filer	51.2	77.7	73%	3.5	2039
All Filers	51.4	77.4	60%	4.4	2039

Table 6-4 shows the effect of these adjustments for age and years played. Without any adjustments, players would be compensated at the maximum value for their injury – shown in the table as the Maximum Monetary Award.

Table 6-4
Effect of Age, Years Played and Inflation on Average and Total Compensation
by Injury Category

Most Serious Injury/ Disease	Maximum Monetary Award	Value After Age Adjustment		Value After Age and Years Played Adjustment		Actual Final Value	
		Average Payment	Total Compensation	Average Payment	Total Compensation	Average Payment	Total Compensation
			(\$ millions)		(\$ millions)		(\$ millions)
Compensable Injury/Disease							
ALS	\$5,000,000	\$2,930,000	\$52.8	\$2,120,000	\$38.1	\$2,740,000	\$49.4
Death w/CTE	\$4,000,000	\$1,910,000	\$85.8	\$1,440,000	\$64.9	\$1,440,000	\$64.9
Parkinson's	\$3,500,000	\$320,000	\$4.5	\$190,000	\$2.7	\$230,000	\$3.2
Alzheimer's	\$3,500,000	\$340,000	\$593.8	\$190,000	\$340.7	\$270,000	\$474.9
Level 2	\$3,000,000	\$210,000	\$368.8	\$140,000	\$246.5	\$190,000	\$341.0
Level 1.5	\$1,500,000	na	na	na	na	na	na
Total, Compensable	na	na	\$1,105.7	na	\$693.0	na	\$933.4

Note: All Level 1.5 are assumed to progress to Level 2. All compensation categorized by most serious injury

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For example, the average payment for diagnosed cases of ALS is \$2.93 million rather than the maximum award amount of \$5 million - a 40% reduction. The average age-adjusted payment for players being diagnosed with Alzheimer's is \$0.34 million, about 90% less than the maximum award amount of \$3.5 million.

Adjusting for years played has a less substantial effect on award values after the age adjustment. For example as Table 6-4 shows, for former players diagnosed with ALS the average payment after the adjustment for number of years played is \$2.1 million – a 28% reduction. The average payment to players diagnosed with Alzheimer's disease is reduced from \$0.34 million to \$0.19 million.

Finally, adjusting for inflation increases average and total compensation. Again, as Table 6-4 shows, adjusting for inflation increases average payments by approximately 30% for ALS and 40% for Alzheimer's, 20% for Parkinson's, no change for death with CTE and approximately 40% for Level 2 neurocognitive disorders. However, the actual final average award amounts for each disease are significantly below the maximum monetary award amounts, resulting in an inflation adjusted total compensation amount of \$933.4 million.

Table 6-5 shows the Monetary Award Grid as it would apply to players who played 3 years in the NFL, *i.e.*, after the discount for 3 playing years is applied. As this table shows, the maximum compensation amounts are 40% lower than the Maximum Award Grid for players who played 5 years or more.

Table 6-5
Monetary Award Grid, for Players who Played 3 years in NFL at Time of Qualifying Diagnosis¹

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	\$3,000,000	\$2,400,000	\$2,100,000	\$2,100,000	\$1,800,000	\$900,000
45 - 49	\$2,700,000	\$1,920,000	\$1,480,000	\$1,380,000	\$1,140,000	\$570,000
50 - 54	\$2,400,000	\$1,380,000	\$1,140,000	\$960,000	\$720,000	\$360,000
55 - 59	\$2,100,000	\$840,000	\$780,000	\$690,000	\$570,000	\$290,000
60 - 64	\$1,800,000	\$720,000	\$600,000	\$570,000	\$350,000	\$170,000
65 - 69	\$1,500,000	\$590,000	\$460,000	\$370,000	\$230,000	\$110,000
70 - 74	\$1,050,000	\$360,000	\$290,000	\$230,000	\$130,000	\$60,000
75 - 79	\$600,000	\$100,000	\$90,000	\$80,000	\$50,000	\$20,000
80+	\$180,000	\$30,000	\$30,000	\$30,000	\$30,000	\$15,000

¹Assumes no other offsets for stroke, TBI, or non-participation in BAP.

Table 6-6 shows the estimated average value of monetary awards that will be paid for each disease across the various age groups. These average awards take into account both the age discount and the years played discount.

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Table 6-6
Average Monetary Awards by Age Group at Time of Qualifying Diagnosis for All Players, Fully Discounted

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5
Under 45	\$2,860,000	\$2,870,000	na	\$1,600,000	\$2,980,000	\$1,490,000
45 - 49	\$2,390,000	\$3,490,000	na	\$1,160,000	\$1,540,000	\$770,000
50 - 54	\$2,160,000	\$1,810,000	\$452,000	\$740,000	\$830,000	\$420,000
55 - 59	\$610,000	\$2,120,000	\$1,420,000	\$500,000	\$490,000	\$250,000
60 - 64	\$1,060,000	\$670,000	na	\$430,000	\$310,000	\$160,000
65 - 69	\$520,000	\$1,100,000	\$200,000	\$270,000	\$140,000	\$70,000
70 - 74	\$470,000	\$550,000	\$100,500	\$150,000	\$80,000	\$40,000
75 - 79	\$280,000	\$160,000	\$106,800	\$50,000	\$20,000	\$10,000
80+	\$50,000	\$40,000	\$22,500	\$10,000	\$10,000	\$10,000

¹Note the analysis assumes that all Level 1.5 claimants progress to more serious injuries. Thus all Level 1.5 amounts are fully netted against the amounts computed for the players ultimate most serious injury.

na - No former players were in this age/injury category

Table 6-7 shows the estimated total amount of the monetary awards that will be paid for each disease in each age group. These total award amounts take into account both the age discount and the years played discount.

Table 6-7
Total Monetary Awards by Age Group at Time of Qualifying Diagnosis for All Players, Fully Discounted

Age Group	ALS	Death w/CTE	Parkinson's	Alzheimer's	Level 2	Level 1.5 ¹
Under 45	\$17,140,000	\$22,980,000	na	\$43,100,000	\$50,650,000	\$25,330,000
45 - 49	\$7,180,000	\$13,950,000	na	\$37,250,000	\$16,890,000	\$8,450,000
50 - 54	\$6,490,000	\$10,840,000	\$452,000	\$43,800,000	\$20,630,000	\$10,320,000
55 - 59	\$610,000	\$6,370,000	\$1,420,000	\$62,570,000	\$32,540,000	\$16,270,000
60 - 64	\$4,220,000	\$2,010,000	na	\$58,350,000	\$38,440,000	\$19,220,000
65 - 69	\$2,080,000	\$5,490,000	\$600,000	\$58,140,000	\$45,420,000	\$22,710,000
70 - 74	\$1,890,000	\$2,740,000	\$402,000	\$45,220,000	\$31,060,000	\$15,530,000
75 - 79	\$280,000	\$1,140,000	\$534,000	\$23,350,000	\$12,990,000	\$6,500,000
80+	\$250,000	\$210,000	\$225,000	\$20,810,000	\$17,460,000	\$8,730,000

¹Note the analysis assumes that all Level 1.5 claimants progress to more serious injuries. Thus all Level 1.5 amounts are fully netted against the amounts computed for the player's ultimate most serious injury.

na - No former players were in this age/injury category

Examples of Monetary Award Calculations

In order to illustrate how the monetary award computation is applied, several hypothetical cases are presented in the following tables. For simplicity, it is assumed that the diagnosis occurs in 2013 or earlier. This means that the nominal amounts are not inflated since the inflation adjustment starts in 2014. These examples show the following four cases:

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Table 6-8A shows the monetary award calculation in the case of a 40-year-old player who had 7 playing years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, there would be no age or years played discount and no joint causality discount, so the player would receive the maximum matrix award value.

Table 6-8A
Example of Monetary Award Calculation

Case: 40 years old, 7 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	<u>%</u>	<u>Amount</u>
Maximum Disease Compensation	100%	\$3,500,000
Less: Age Discount	0%	\$0
Less: Years Played Discount	0%	\$0
Less: Prior Stroke/TBI Discount	<u>0%</u>	<u>\$0</u>
Final Award (% of Maximum/Payment Amount)	100%	\$3,500,000

Table 6-8B shows the monetary award calculation in the case of a 57-year-old who played in the NFL for 3.5 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 67% is applied and there is a discount for years played of 30%. The resulting payment would be 23% of the full matrix value (a 77% discount from maximum value).

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Table 6-8B**Example of Monetary Award Calculation**

Case: 57 years old, 3.5 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	<u>%</u>	<u>Amount</u>
Maximum Disease Compensation	100%	\$3,500,000
Less: Age Discount	-67%	-\$2,350,000
Less: Years Played Discount	-30%	-\$345,000
Less: Prior Stroke/TBI Discount	<u>0</u>	<u>\$0</u>
Final Award (% of Maximum/Payment Amount)	23%	\$805,000

Table 6-8C shows the monetary award calculation in the case of a 62-year-old who played in the NFL for 2 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 73% is applied and there is a discount for years played of 60%. The resulting payment would be 11% of the full matrix value (an 89% discount from maximum value).

Table 6-8C**Example of Monetary Award Calculation**

Case: 62 years old, 2 years playing, Alzheimer's diagnosis, no Prior Stroke or TBI

	<u>%</u>	<u>Amount</u>
Maximum Disease Compensation	100%	\$3,500,000
Less: Age Discount	-73%	-\$2,550,000
Less: Years Played Discount	-60%	-\$570,000
Less: Prior Stroke/TBI Discount	<u>0</u>	<u>\$0</u>
Final Award (% of Maximum/Payment Amount)	11%	\$380,000

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Table 6-8D shows the monetary award calculation in the case of a 72-year-old who played in the NFL for 10 years and was diagnosed with Alzheimer's with no prior history of stroke or TBI. In this case, an age discount of 89% is applied and there is no discount for years played because he played more than 5 years. The resulting payment would be 3% of the full matrix value (a 97% discount from maximum value).

Table 6-8D
Example of Monetary Award Calculation

Case: 72 years old, 10 years playing, Alzheimer's diagnosis, with Prior Stroke

	<u>%</u>	<u>Amount</u>
Maximum Disease Compensation	100%	\$3,500,000
Less: Age Discount	-89%	-\$3,120,000
Less: Years Played Discount	0%	\$0
Less: Prior Stroke/TBI Discount	<u>-75%</u>	<u>-\$285,000</u>
Final Award (% of Maximum/Payment Amount)	3%	\$95,000

7. Cost Estimate

The analysis forecasts that a total of 3,596 former NFL players who participate in the settlement will contract compensable diseases over the life of the program. The majority of these compensable diseases, about 98%, will be cases of Alzheimer's or Level 2 neurocognitive disorders. The total nominal cost for all compensable diseases including administration costs is estimated to be \$933 million over the life of the program.

Total Compensable Claims and Compensation

Table 7-1 provides a summary of compensable claims and total compensation by type of injury. The overwhelming percent of compensable claims and compensation are paid to former players with Alzheimer's disease or Level 2 neurocognitive disorders – 98% of compensable claims and 87% of compensation. The distribution of claims reflects the relative probabilities of the occurrence of the various diseases in the general population combined with the additional incidence related to concussions.

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Table 7-1
Former Players with Compensable Concussion-Related Injury
by Type of Injury with Total Compensation
(\$ millions)

Most Serious Injury/ Disease	Total Claims		Total Compensation	
	Count	Percent	Amount	Percent
Compensable Injury/Disease				
ALS	18	0.5%	\$49.4	5.3%
Death w/CTE	46	1.3%	\$64.9	7.0%
Parkinson's	14	0.4%	\$3.2	0.3%
Alzheimer's	1,757	48.9%	\$474.9	50.9%
Level 2	1,761	49.0%	\$341.0	36.5%
Level 1.5	na	na	na	na
Total, Compensable	3,596	100.0%	\$933.4	100.0%
Not Compensated	17,474	na	na	na
Grand Total	21,070	na	\$933.4	100.0%

Note: All compensation categorized by most serious injury. All Level 1.5 claims are assumed to progress to Level 2 and more serious levels. \$248 million is paid to former players at Level 1.5. This amount is included in the category of their most serious disease as follows: \$212 million paid at Level 2; \$34 million to Alzheimer's and \$2 million to other disease types. Players are not compensated because they did not experience a compensable injury or did not file a claim.

Timing of Compensation Payments and Funding

Table 7-2 shows the timing of payments to former players and the receipt of funding by the settlement fund through the payment of the last compensable claim. The timing and total amount of funding are sufficient to pay all claims.

- Compensation payments in the first five years are high because there are a relatively large number of former NFL players who have indicated they intend to file a claim. These claimants include former players who have already been diagnosed with a disease and will be paid in the first few years of the settlement fund. After these claims are resolved, the fund will be receiving and paying claims at a significantly lower rate as the filing of future claims depends on the timing of the manifestation of future compensable injuries.
- The initial funding amount of approximately \$364 million (55% of the total funding) is designed to provide enough assets to pay the compensable claims already identified and to cover the startup costs of the claim processing facility while still leaving a significant

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asset. The remaining assets are supplemented with an additional \$311 million, which is paid in annual installments through 2033. At that time the remaining assets of the settlement fund (with earnings) are sufficient to pay all remaining claims.

- The Fund Balance increases through 2034 as the additional funding and earnings exceed the required amount to pay claims. The fund balance begins to decline after that as the settlement fund continues to pay claims, but with earnings as its only source of revenue - there is no additional funding contributed after 2033. The last claim is paid in the early 2080s, at which time the fund is estimated to have a balance of approximately \$80 million.¹⁶

Table 7-2
Settlement Fund Compensation Payments, Funding and Earnings
Through the Payment of the Last Compensable Claim
(\$ millions)

Time Period	Compensation Amount ¹	Funding	Earnings	End of Period Fund Balance
2014 through 2018	\$292.3	\$364.0	\$25.0	\$91.6
2019 through 2023	\$78.2	\$103.7	\$28.1	\$143.8
2024 through 2028	\$95.5	\$103.7	\$38.6	\$189.0
2029 through 2038	\$178.6	\$103.7	\$103.2	\$214.0
2039 through 2048	\$167.7	\$0.0	\$72.9	\$116.2
Remaining 35 Years	\$133.3	\$0.0	\$103.4	\$80.4
Total	\$945.5	\$675.0	\$371.2	na

¹Includes processing Costs

Note: Funding plus earnings is actually slightly in excess of the amount needed to pay all claims.

Inflation and Real Rate of Return

A key assumption in determining whether the settlement is adequately funded is the real rate of return earned on settlement assets. I have assumed a 2.5% real rate of return – a 4.5% nominal yield and an underlying 2.0% inflation rate. The actual expected return is dependent on the real returns available for different types of assets and the portfolio mix adopted by the settlement administrators.

¹⁶ The \$80 million balance in the early 2080s implies overfunding of only approximately \$5 million at 2014 levels.

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Historical experience suggests that a real rate of return of 2.5% is at the lower level of expected returns. Returns on debt and equity both exceed 2.5% real rate of return over long periods of time. Indeed, even an extremely high reliance on low risk financial assets historically has yielded more than 2.5% annually. However, because of historically low bond yields in recent years, I conservatively assumed a 2.5% return.

Studies of real rates of return reflect that over long periods of time through recent years, the real rate of return (after inflation) on long-term U.S. government bonds was approximately 3.4% annually; municipal bonds yielded approximately 3.9% real return annually and equities of different categories yielded 5-6% in real return annually. Thus, any mixed portfolio of equities and long-term government bonds would have yielded a 4% to 5% annual return in real terms.

The average annualized real return for a 50% equity/50% bond portfolio over the last 80+ years both for expansionary periods and for recessions exceeds 2.5%. Indeed, the average annual real return for recessions is 5.26%, while for expansions, it is 5.59%.

Finally, an examination of mutual funds (and among them, focusing on the ones with conservative asset allocation) shows that the overwhelming majority (98.3%) of funds returned at least 2.5% in real terms over the last five years.¹⁷

Timing of Claim Payments

There will be a time lag between the time a claim is filed and the date of disbursement of compensation. To allow for claims to be reviewed, processed (including the curing of any deficiencies) and paid, the analysis assumes that payments for all the claims filed within any given calendar year will be paid within 24 months (an average of 12 months) based on the following distribution of claim payments:

- 30% will be paid in the year the claim is filed
- 40% will be paid in the year after the claim was filed
- 30% will be paid in the second year after the claim was filed.

The analysis assumes that all of the claims that have already been filed and have diagnoses or the player is deceased will be paid - 70% in 2015 and 30% in 2016¹⁸.

The model is based on a nominal rate of return on invested funds of 4.5%. Inflation over the life of the fund is assumed to be 2.0% per year and this rate is applied to future monetary award amounts as well as administration costs.

¹⁷ References: David Blanchett, Michael Finke and Wade D. Pfau (2013), "Low Bond Yields and Safe Portfolio Withdrawal Rates," Morningstar Investment Management, January 21, 2013; Joseph Davis and Daniel Piquet (2011), "Recessions and balanced portfolio returns," Vanguard, October 2011, and; Thornburg Investment Management (2013), "A Study of Real Real Returns," July 2013.

¹⁸ A 95% participation rate assumption is applied to claims already filed that do not have a current diagnosis.

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Administration Costs

Based on information provided by the Claims Administrator and the CMS Lien Administrator, the following costs have been included in the cash flow modeling:

- Start-up costs – a total of \$2 million in start-up costs for the Monetary Award Fund are assumed to occur in 2014.
- Claim review and processing costs – an average cost of \$750 per claim including both valid claims and claims that will not be paid are assumed to be incurred at the time of diagnosis for valid claims. It is assumed that there will be an equal number of valid and invalid claims. Therefore the model applies a combined total cost of \$1,500 to each valid claim.
- CMS lien processing – there will be a \$100 processing charge to the MAF applied to each claim, which is applied to both valid and invalid claims. It is assumed that there will be an equal number of valid and invalid claims. Therefore, the model applies a combined total cost of \$200 to each valid claim. All other costs for CMS lien handling are charged against individual monetary awards and does not affect the cash flow of the settlement fund.
- Payments to the Special Master of \$100,000 per year for five years.

Player Participation Rates

The participation rate in the Settlement program among eligible former NFL players is a significant factor in determining the number of claims that will be filed and thus also the amount of funds required to resolve the claims.

In order to establish an estimate of the participation rate, several factors were considered. First, experience with participation rates in other mass tort cases was reviewed. In general, participation rates in mass torts are dependent on the outreach and notice program, the lag from exposure/injury to the manifestation of a compensable disease/injury and award size. For comparison, the participation rates for various large and widely publicized class action settlements and data on consumer product recall response rates were considered:

- Breast implant settlement achieved registrations from 30% of the eligible class members (440,000 of 1.5 million), based on an advertising-only class notification program.
- Consumer product recall response rates range from 4% to 18% according to the U.S. Consumer Product Safety Commission (CPSC).

In the case of former NFL players, approximately 4,200 claims were already registered at the time this analysis was prepared, which represents more than 20% of the potentially eligible population of approximately 20,200 former players.¹⁹ I understand that former players have been

¹⁹ Additional claims have been filed since this analysis was performed.

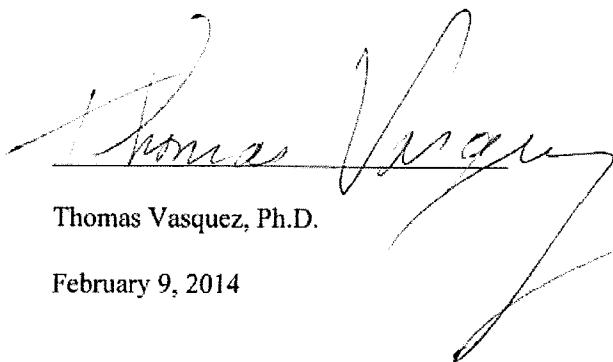
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and continue to be contacted by plaintiff lawyers and others to participate. Whether continuing further efforts are likely to attract a significant number of additional players is not certain.

Nonetheless, it is assumed that the participation rates in this settlement will achieve high levels because the settlement has very high public visibility and contact information available through the NFL Players union and other sources that can be used in the notification process is available for a large portion of the potentially eligible population. My forecast of the number of future claims and the resulting cash requirements to fund the settlement assumes that: (1) 100% of deceased players with CTE will participate, (2) 20% of players deceased from 2000 through 2005 will participate, (3) 100% of players with a diagnosis that have already filed claims will participate, (4) 95% of players without a diagnosis that have already filed a claim will participate and (5) 50% of the living and deceased former NFL players that have not yet filed will ultimately participate. These assumptions yield an approximately 60% participation rate for all potentially eligible former players.

The Settlement Agreement provides a Baseline Assessment Program (BAP) for players who participate in the settlement. However, if a player (who is not yet diagnosed with a compensable disease) registers to participate in the Settlement Agreement but does not participate in the baseline assessment provided for under the BAP, a 10% discount is applied to any future monetary award for a compensable disease. This analysis assumed that all players who participate in the Settlement Agreement will also participate in the BAP and therefore no discounts were applied to future compensation awards.

My work on this matter is ongoing. I reserve the right to update or expand upon the opinions expressed in this report on the basis of that work, and in response to any analysis put forth by other experts.



Thomas Vasquez, Ph.D.

February 9, 2014

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Appendix A: Determination of Incidence Rates***Background Incidence***

This section describes ARPC's methodology and reference sources used to determine background incidence rates of diseases that might be associated with concussions and other repetitive head injuries, and therefore, potentially considered as a compensable disease. When incidence rates were available by gender, we captured the rates for men only. For some diseases, rates were not available by gender; in these cases the reported statistics are for both genders.

Extrapolating to younger ages

For some diseases, incidence (or prevalence) rates were available only for the population above a certain age (*e.g.*, 65). In these cases, we assumed that the rate for a 20-year-old would be equal to one-hundredth of the rate for a 65-year-old. For ages between 20 and 65, we assumed that the rate increases exponentially.

The literature indicates that diseases associated with advanced age (*e.g.*, Alzheimer's and dementia), rarely occur in young age, and reliable statistics for young ages are not available.

Exponential smoothing

Diseases for which there were estimates of incidence available for various age ranges instead of a particular age, a midpoint in the age range was chosen (in the case of ages 85+, typically age 90 was used), and the estimated incidence rate for that age group was assigned to that midpoint. Between data points, an exponential curve was fit based on the starting and ending rates, and the number of years in between them.

Stroke-Related Alzheimer's disease and Dementia

Alzheimer's disease and dementia can sometimes be attributed to prior history of stroke. According to epidemiological research, 8 to 10 percent of Alzheimer's and dementia patients had a history of stroke prior to the onset of Alzheimer's or dementia. Claimants who fall into this category will receive 25 percent of the compensation they would receive if they had not had a prior history of stroke. To reflect the reduction in the total compensation amount, the overall incidence numbers for Alzheimer's and dementia were reduced by a number equal to 75 percent of those who also had prior history of stroke (*i.e.*, only a quarter of those with a stroke history are included in the background incidence).

References

- Dodge, Chang, Kamboh, Ganguli (2011), “Risk of Alzheimer’s Disease Incidence Attributable to Vascular Disease in the Population,” *Alzheimers Dement.* 2011 May; 7(3): 356–360

Approach and Reference Sources for Specific Conditions**1. Alzheimer’s Disease**

Table 1 of Hebert, et al. (2001) provides the estimated annual number of incidence cases from 1995 through 2050 by age group. Figures for 2010 were used in the life cycle model. Estimates were available for the following three age categories: 65-74, 75-84, and 85+. To calculate an estimate for age categories between 20 and 65, an exponential extrapolation method was used, by also assuming that the rate for a 20-year-old was one hundredth of the rate for a 65-year-old. No gender-specific rates were available therefore the statistics are for both genders. However, many studies of the age-specific incidence (development of new cases) of Alzheimer’s disease or any dementia have found no significant difference by gender.

As noted earlier, a final modification was made to the incidence rates based on the number of Alzheimer’s disease patients who have had a stroke history to account for joint causality.

References

- Alzheimer’s Association, “2013 Alzheimer’s Disease Facts and Figures,” 2013
- Hebert, Beckett, Scherr, and Evans, “Annual Incidence of Alzheimer’s Disease in the United States Projected to the Years 2000 Through 2050,” *Alzheimer’s Disease and Associated Disorders* 2001; Vol. 15, No. 4, pp. 169–173

2. ALS

An overall incidence rate was reported from two sources, both citing the same figure: 2 per 100,000 persons per year. While ALS can be diagnosed at any age, typically it is diagnosed between age 40 and 70. Hence, it was assumed that the rate is constant 2/100,000 for ages between 40 and 70. For under age 40, the extrapolation to younger ages was performed, as

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described above. For over age 70, the incidence rate was assumed to be 2/100,000. No gender-specific rates were available therefore the statistics are for both genders.

References

- ALS Association, “Epidemiology of ALS and Suspected Clusters,” retrieved from <http://www.alsa.org/als-care/resources/publications-videos/factsheets/epidemiology.html> on July 1, 2013.
- The Robert Packard Center for ALS at Johns Hopkins, “ALS Facts and Statistics”, retrieved from http://www.alscenter.org/living_with_als/facts_statistics.html on July 15, 2013.
- Statistics Brain, “Lou Gehrig’s Disease ALS Statistics” retrieved from <http://www.statisticbrain.com/lou-gehrigs-disease-als-statistics/> on June 25, 2013.
- Clark, Pritchard and Sunak, “The Epidemiology and Etiology of Amyotrophic Lateral Sclerosis: An Integrated and Inter-Disciplinary Perspective”, *A Working Report to the Department of Public Health, State of Massachusetts* on behalf of the ALS Therapy Development Foundation, Massachusetts, page 2 of 106 retrieved from http://www.researchals.org/uploaded_files/mdph_alsreport_211aDS.pdf on June 25, 2013.

3. Parkinson’s Disease

The incidence rates for Parkinson’s disease were obtained from a study by Van Den Eeden et al. (2003), which examined newly diagnosed Parkinson’s disease cases in 1994-1995 among members of the Kaiser Permanente Medical Care Program of Northern California. Table 2 of the study provides annual incidence rates by age and gender. The statistics we use are for men only.

References

- Van Den Eeden, Tanner, Bernstein, Fross, Leimpeter, Bloch, and Nelson, “Incidence of Parkinson’s Disease: Variation by Age, Gender, and Race/Ethnicity,” *Am. J. Epidemiol.* 2003; 157 (11): 1015–1022

4. Dementia

Incidence rates were available from multiple sources for dementia. In particular, the following sources were used:

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- Corrada, et al. (2010); Table 2; Incidence rates for 4 specific age groups; US – men only
- Fitzpatrick, et al. (2004); Table 1; Incidence rates for 4 specific age groups; US – white men only
- Ganguli, et al. (2000); Table 1; Incidence rates for 6 specific age groups; US – men only; more severe dementia with CDR \geq 1.0
- Hendrie, et al. (2001); Table 5; Incidence rates for 3 specific age groups; African Americans in US – both sexes
- Knopman, et al. (2006); Table 1; Incidence rates for 9 specific age groups; US – men only
- Jorm and Jolley (1998); Table 2; Incidence rates for 5 specific age groups; US – both sexes; moderate+ dementia
- Riedel-Heller, et al. (2001); Table 1 and 2; Incidence rates for 4 specific age groups; Germany – men only

After careful examination of these data sources, the rates reported by Corrada, et al. (2010) and Knopman, et al. (2006) appeared to be outliers relative to the other sources. Therefore, these two studies were excluded and average age-specific incidence rates were calculated on the basis of the other five studies. As indicated above, all of these sources reported age-specific rates, but only for people older than 65. To estimate incidence rates for people younger than 65, Harvey et al. (2003) was used. This study reported age-specific prevalence rates for the population between 30 and 65. These prevalence rates were very small (each of them significantly smaller than the incidence rates for each of the age categories above 65). Since for a terminal (*i.e.*, incurable) disease such as dementia, prevalence is always an upper bound for incidence, we assumed that incidence rates for the population below 65 is equal to the prevalence rate.

A modification was made to these dementia incidence rates because of the relationship between Alzheimer's disease and dementia. Alzheimer's disease is the most common type of dementia, and eventually all Alzheimer's patients will develop dementia. However, not all dementia is due to Alzheimer's disease.²⁰ Thus, the calculated overall dementia incidence rates shown above in figure 2.1 include all cases of Alzheimer's disease. To correct for this, the Alzheimer's disease incidence rates were subtracted from the overall dementia incidence rates. Consistent with Friedenber (2003), exclusion of Alzheimer's disease incidence approximately halved the calculated incidence of dementia – for example, at age 95, the 4.103% Alzheimer's incidence rate was subtracted from the overall dementia incidence rate of 9.57%, resulting in a non-Alzheimer's dementia incidence rate of 5.467%.

As noted above in the general remarks, a final modification was made to the incidence rates based on the number of dementia patients who have had a stroke history.

²⁰ One study, by Friedenber (2003), found that patients with Alzheimer's disease comprised approximately 50% of all dementia cases, with Lewy dementia and frontotemporal dementia each comprising approximately 15% of total dementia cases, and vascular dementia comprising a further 10% of all dementia cases.

References

- Alzheimer's Association, "2013 Alzheimer's Disease Facts and Figures," 2013
- Corrada, Brookmeyer, Paganini-Hill, Berlau, and Kawas, "Dementia Incidence Continues to Increase with Age in the Oldest Old: The 90+ Study," *Ann Neurol.* 2010 January; 67(1): 114–121
- Fitzpatrick, Kuller, Ives, Lopez, Jagust, Breitner, Jones, Lyketsos, and Dulberg, "Incidence and Prevalence of Dementia in the Cardiovascular Health Study," *Journal of American Geriatric Society* 2004; 52: 195–204
- Friedenber, "Dementia: One of the Greatest Fears of Aging," *Radiology* 2003; 229: 632–635
- Ganguli, Dodge, and Chen, "Ten-year Incidence of Dementia in a Rural Elderly US Community population: The MoVIES Project," *Neurology* 2000; 54: 1109–1116
- Harvey, Skelton-Robinson, and Rossor, "Prevalence and Causes of Dementia in People Under the Age of 65 Years," *J Neurol Neurosurg Psychiatry* 2003; 74: 1206–1209
- Hendrie, Ogunniyi, Hall, Baiyewu, Unverzagt, Gureje, Gao, Evans, Ogunseyinde, Adeyinka, Musick, and Hui, "Incidence of Dementia and Alzheimer Disease in 2 Communities," *JAMA* February 14, 2001; Vol. 285, No. 6 739–747
- Jorm and Jolley, "The incidence of dementia: A meta-analysis," *Neurology* 1998; 51: 728–733
- Knopman, Petersen, Cha, Edland, and Rocca, "Incidence and Causes of Nondegenerative Nonvascular Dementia," *Arch Neurol.* 2006; 63: 218–221
- Riedel-Heller, Busse, Aurich, Matschinger, and Angermeyer, "Incidence of Dementia According to DSM-III-R and ICD-10," *British Journal of Psychiatry* 2001; 179: 255–260

Induced Incidence/Risk Multiplier

This section describes the methodology and sources used for estimating the increased risk to professional football players (or comparables) relative to the general population of developing certain compensable diseases.

For Alzheimer's disease, Parkinson's, ALS and dementia, a risk multiple of 2.0 for ages 20 through 60 was used. After age 60, it was assumed that the relative risk is more additive in nature than multiplicative, and so the induced incidence is calculated as the background (general population) incidence at those ages, plus the induced incidence rates at age 60 for each of the diseases

For each of the particular diseases discussed below, there were multiple sources reporting a risk to professional football players as a multiple of the risk experienced by the general population. Unless otherwise specified, risk multiples are uniform across ages (e.g., the relative risk is the

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same across ages for professional football players). For the majority of diseases, no peer-reviewed published research on the risk to professional football players relative to the general population has been identified.

It is clear that the literature and studies to date conclude a wide range of estimates of the relative risk associated with concussion or other forms of brain injury. The results vary from relative risk significantly under 1.0 to risks in excess of 3.0. Many if not all of the studies have issues that question their accuracy. These issues include items such as small sample sizes, types of populations, types of injuries and characteristics of the studied population.

Specific diseases, disorders, injuries, and symptoms

5. Alzheimer's Disease

There were two sources identified that report the relative risk of Alzheimer's for professional football players (Guskiewicz (2005) and Lehman (2012)) and three studies on the risk from mild traumatic brain injuries for developing Alzheimer's disease. The induced incidence rates reported in these studies range from 0.76 to 4.1. Lehman (2012) reported that the risk of Alzheimer's being a contributing factor to death, *i.e.*, not necessarily the underlying cause, was 3.86 times greater for former NFL players who had played 5 years or more than for the general population. Guskiewicz (2005) noted a differential in the risk as a function of age, with the risk declining from 4 among younger players to 1 for players over the age of 75.

Mortimer (1991), in a meta-analysis of 7 previous studies, found a relative risk of 2.67 for men. Nemetz (1999) found that the standardized incidence ratio was 1.4 for men who had experienced a traumatic brain injury, from a population cohort in Olmsted County, Minnesota. Mehta (1999), using a population cohort from Rotterdam, The Netherlands, found a relative risk for men of 0.9. Plassman (2000), in a population-based cohort study of U.S. World War II veterans, found a hazard ratio for those who suffered a mild head injury (defined as a "loss of consciousness or post-traumatic amnesia for less than 30 minutes, with no skull fracture") of 0.76. Schofield (1997), in a community longitudinal study in Manhattan, NY, found a relative risk of developing Alzheimer's of 4.1 for those who had a history of head injury.

References

- Guskiewicz, Kevin M., et al., "Association between Recurrent Concussion and Late-Life Cognitive Impairment in Retired Professional Football Players," *Neurosurgery*, Vol. 57, No. 4 (Oct. 2005): 719-726

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- Lehman, Everett J., et al., “Neurodegenerative causes of death among retired National Football League players,” *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Mehta, K.M., et al., “Head trauma and risk of dementia and Alzheimer’s disease,” *Neurology*, Vol. 53 (1999): 1959-1962
- Mortimer, J.A., et al., “Head Trauma as a Risk Factor for Alzheimer’s Disease: A Collaborative Re-Analysis of Case-Control Studies,” *International Journal of Epidemiology*, Vol. 20, No. 2 (1991): S28-S35
- Nemetz, Peter N., et al., “Traumatic Brain Injury and Time to Onset of Alzheimer’s Disease: A population-based study,” *American Journal of Epidemiology* Vol. 149, No. 1 (1999): 32-40
- Plassman, B.L., et al., “Documented head injury in early adulthood and risk of Alzheimer’s disease and other dementias,” *Neurology*, Vol. 55 (2000): 1158-1166
- Schofield, P.W. et al., “Alzheimer’s disease after remote head injury: an incidence study,” *Journal of Neurology, Neurosurgery and Psychiatry*, Vol. 62 (1997): 119-124

6. ALS

There was no study that directly isolated the induced risk of ALS among former NFL players. The findings of three studies reported estimated induced incidence ranging from 1.13 to 4.31. These include the Lehman study (Lehman (2012)), which looked at ALS as a contributing factor (*i.e.*, not necessarily the specific cause of death) for a more exposed population of retired professional football players – those who had played 5 years or more. From the Schmidt (2010) study of veterans, we calculated a risk multiple of 1.13 for veteran suffering head injuries developing ALS relative to those without head injuries.²¹ No age-breakdowns were available from Lehman (2012) or Schmidt (2010) (although Schmidt did provide a breakdown for the age at the time of the last injury, with those being injured after age 29 being at a 1.49 times risk). Chio (2005) looked at the effect of age on risk among a population of Italian soccer players, and found that for ages up to 49, the Standard Morbidity Ratio was 7.5, but then fell to 4.2 for those older than 50.

References

- Lehman, Everett J., et al., “Neurodegenerative causes of death among retired National Football League players,” *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Schmidt, Silke, et al., “Association of ALS with Head Injury, Cigarette Smoking and APOE Genotypes,” *Journal of Neurological Science* Vol. 291 (April 2010): 22-29

²¹ Schmidt (2010) reported Odds Ratios in its text. We have calculated from the underlying data reported in Schmidt (2010) a risk multiple for ease of comparison to the other studies.

- Chio, Adriano, et al., “Severely increased risk of amyotrophic lateral sclerosis among Italian professional football players,” *Brain* Vol. 128 (2005): 472-476

7. Dementia

Five studies were considered with respect to the increased risk of dementia. These studies produced estimates of induced risk ranging from 0.7 to 3.86. Again, Lehman (2012) reported that the risk of Dementia as a contributing factor to a player’s death (*i.e.*, not necessarily the specific cause of death) was 3.86. Mehta (1999), in a population-based cohort from The Netherlands, found the risk multiple for men developing dementia was 0.7. Plassman (2000) found that hazard rate for a cohort of U.S. Navy and Marine veterans of World War II was 1.33. Finally, Lee (2013), in a population-based study from Taiwan, found a hazard ratio of 3.26. Another source, Amen (2011) was excluded because of the small sample size (n=100), and inconsistency between prevalence and incidence in its calculations.

References

- Amen, Daniel G. et al., “Impact of Playing American Professional Football on Long-Term Brain Function,” *Journal of Neuropsychiatry and Clinical Neuroscience*, Vol. 23, No. 1 (Winter 2011): 98-106
- Lee, Yi-Kung, et al., “Increased Risk of Dementia in Patients with Mild Traumatic Brain Injury: A Nationwide Cohort Study,” *PLOS ONE*, Vol. 8, No. 5 (May 2013): 1-7,
- Lehman, Everett J. et al., “Neurodegenerative causes of death among retired National Football League players,” *Neurology* Vol. 79 (Nov. 6, 2012): 1-5
- Mehta, K.M. et al., “Head trauma and risk of dementia and Alzheimer’s disease,” *Neurology*, Vol. 53 (1999): 1959-1962
- Plassman, B.L. et al., “Documented head injury in early adulthood and risk of Alzheimer’s disease and other dementias,” *Neurology*, Vol. 55 (2000): 1158-1166

8. Parkinson’s Disease

Four sources were identified that calculated a risk multiple for Parkinson’s Disease, one based on a study of retired NFL players, and three more generalized to the risk of Parkinson’s after a traumatic brain/head injury. These studies reported risk multiples ranging from 1.44 to 1.69. The Lehman (2012) study found that the risk of a retired NFL player dying with Parkinson’s as a contributing factor was 1.69 times greater than that of the male general population.

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From the Bower (2003) study of U.S. males and females from Rochester, Minnesota we calculated a risk multiple of 1.76, while from Lee (2012), we calculated a 1.44 risk multiple for the central-California-based sample. From the Goldman (2006) study on male twin pairs, we calculated a risk multiple of 1.48.²² Both Goldman (2006) and Bower (2003) are for males only, while the only data available from Lee (2012) was for both genders. Multiple additional studies on the impact of brain trauma are available (summarized in Goldman (2006)), but all were conducted in the 1980s and 1990s. No further breakdowns of the multiple by age were available in any of the studies.

References

- Bower, J.H. et al, “Head Trauma Preceding PD: A Case-Control Study,” *Neurology* Vol. 60 (2003): 1610-1615
- Goldman, Samuel M. et al., “Head Injury and Parkinson’s Disease Risk in Twins,” *Annals of Neurology*, Vol. 60 (2006): 65-72
- Lee, Pei-Chen et al., “Traumatic Brain Injury, Paraquat Exposure, and Their Relationship to Parkinson Disease,” *Neurology* Vol. 79 (2012): 2061-2066.
- Lehman, Everett J. et al., “Neurodegenerative causes of death among retired National Football League players,” *Neurology* Vol. 79 (Nov. 6, 2012): 1-5

²² Bower (2003), Lee (2012) and Goldman (2006) all reported only the Odds Ratios in their texts, so for comparison purposes, we have calculated the corresponding Risk Ratio for use in the average.

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Appendix B: Annual Cash Flow Model and Assumptions

Cash Flow Modeling Assumptions		
Item Category	Assumed Value	Notes
Funding and Investment	2.0%	
Inflation on Monetary Award Amounts	2.5%	
Real rate of return on invested funds	4.5%	
Nominal rate of return on invested funds		
Claim Review and Processing		
Facility start up costs	\$2,000,000	
Cost per claim	\$1,700	Expected cost for claim review and processing is \$750/claim. There is an additional \$100 fee per claim for processing medicare liens. Both fees are applied to claims that are filed, including those that are valid for payment and claims that will not be paid. The model counts the number of valid claims. It is assumed that there will be an equal number of payable and non-payable claims so a total cost of \$1,700 per valid claim is used in the model (2 x \$750) + (2 x \$100)
Inflation on processing costs	2.0%	

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Dollars by Year Paid - Accounting for Payment Lag and Participation Rate
(\$ millions)

Year	Filers		Futures		Deceased >2005		Death w/ CTE		Deceased <=2005		Processing Cost		Total	
	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV	Nom.	NPV
Total	\$426.9	\$251.2	\$415.7	\$179.1	\$19.3	\$17.8	\$65.7	\$60.7	\$5.7	\$5.3	\$10.1	\$3.2	\$945.5	\$519.4
2013														
2014													\$2.0	\$2.0
2015	\$98.0	\$91.8	\$12.5	\$11.7	\$13.5	\$12.6	\$46.0	\$43.1	\$4.0	\$3.8	\$0.2	\$0.2	\$174.2	\$163.0
2016	\$46.8	\$41.9	\$10.3	\$9.3	\$5.8	\$5.2	\$19.7	\$17.7	\$1.7	\$1.5	\$0.2	\$0.2	\$84.5	\$75.7
2017	\$8.0	\$6.9	\$7.9	\$6.7		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$16.0	\$13.7
2018	\$6.8	\$5.5	\$8.6	\$7.0		\$0.0		\$0.0		\$0.0	\$0.2	\$0.2	\$15.5	\$12.7
2019	\$6.4	\$5.0	\$9.1	\$7.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$15.7	\$12.3
2020	\$6.2	\$4.7	\$9.2	\$6.9		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$15.5	\$11.6
2021	\$5.6	\$4.0	\$8.5	\$6.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$14.1	\$10.2
2022	\$5.8	\$4.0	\$9.7	\$6.7		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$15.6	\$10.7
2023	\$7.1	\$4.7	\$10.1	\$6.6		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$17.3	\$11.4
2024	\$8.2	\$5.2	\$10.2	\$6.4		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$18.6	\$11.7
2025	\$8.3	\$5.0	\$11.5	\$6.9		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$19.9	\$12.0
2026	\$7.3	\$4.2	\$12.4	\$7.2		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$19.8	\$11.4
2027	\$7.4	\$4.1	\$11.8	\$6.5		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$19.3	\$10.7
2028	\$6.9	\$3.6	\$10.8	\$5.7		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$17.8	\$9.4
2029	\$7.5	\$3.8	\$10.0	\$5.0		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$17.6	\$8.9
2030	\$9.1	\$4.4	\$8.5	\$4.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$17.7	\$8.6
2031	\$8.8	\$4.1	\$8.1	\$3.7		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$17.0	\$7.9
2032	\$7.4	\$3.3	\$9.1	\$4.0		\$0.0		\$0.0		\$0.0	\$0.1	\$0.1	\$16.7	\$7.4
2033	\$6.6	\$2.8	\$9.7	\$4.1		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$16.4	\$7.0
2034	\$7.4	\$3.0	\$9.3	\$3.8		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$16.8	\$6.8
2035	\$8.0	\$3.1	\$9.6	\$3.7		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$17.8	\$6.9
2036	\$9.0	\$3.3	\$10.3	\$3.8		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$19.5	\$7.2
2037	\$9.2	\$3.3	\$10.4	\$3.7		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$19.8	\$7.0
2038	\$8.8	\$3.0	\$10.3	\$3.5		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$19.3	\$6.6
2039	\$7.6	\$2.5	\$10.0	\$3.3		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$17.8	\$5.8
2040	\$6.9	\$2.2	\$11.5	\$3.6		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$18.7	\$5.8
2041	\$6.8	\$2.0	\$11.5	\$3.4		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$18.6	\$5.5
2042	\$6.7	\$1.9	\$10.6	\$3.0		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$17.6	\$5.0
2043	\$7.8	\$2.1	\$8.2	\$2.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$16.1	\$4.4
2044	\$8.1	\$2.1	\$7.7	\$2.0		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$16.0	\$4.2
2045	\$8.8	\$2.2	\$6.5	\$1.6		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$15.5	\$3.9
2046	\$7.9	\$1.9	\$8.4	\$2.0		\$0.0		\$0.0		\$0.0	\$0.3	\$0.1	\$16.5	\$4.0
2047	\$6.4	\$1.5	\$9.5	\$2.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$16.1	\$3.7
2048	\$4.5	\$1.0	\$10.2	\$2.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.1	\$14.9	\$3.3
2049	\$3.9	\$0.8	\$8.2	\$1.7		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$12.3	\$2.6
2050	\$3.8	\$0.8	\$7.9	\$1.6		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$11.8	\$2.4
2051	\$4.2	\$0.8	\$6.6	\$1.3		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$11.0	\$2.1
2052	\$4.6	\$0.8	\$5.7	\$1.1		\$0.0		\$0.0		\$0.0	\$0.3	\$0.0	\$10.6	\$1.9
2053	\$4.6	\$0.8	\$5.5	\$1.0		\$0.0		\$0.0		\$0.0	\$0.3	\$0.0	\$10.3	\$1.8
2054	\$3.7	\$0.6	\$5.2	\$0.9		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$9.2	\$1.5
2055	\$2.8	\$0.5	\$5.2	\$0.8		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$8.2	\$1.3
2056	\$2.5	\$0.4	\$4.5	\$0.7		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$7.3	\$1.1
2057	\$2.2	\$0.3	\$4.2	\$0.6		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$6.7	\$1.0
2058	\$1.9	\$0.3	\$4.1	\$0.6		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$6.1	\$0.9
2059	\$1.6	\$0.2	\$3.9	\$0.5		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$5.6	\$0.8
2060	\$1.3	\$0.2	\$3.3	\$0.4		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$4.8	\$0.6
2061	\$1.4	\$0.2	\$2.6	\$0.3		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$4.2	\$0.5
2062	\$1.2	\$0.1	\$2.2	\$0.3		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$3.6	\$0.4
2063	\$0.9	\$0.1	\$1.9	\$0.2		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$3.0	\$0.3
2064	\$0.7	\$0.1	\$1.8	\$0.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$2.6	\$0.3
2065	\$0.6	\$0.1	\$1.7	\$0.2		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$2.4	\$0.2
2066	\$0.6	\$0.1	\$1.5	\$0.2		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$2.3	\$0.2
2067	\$0.6	\$0.1	\$1.3	\$0.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$1.9	\$0.2
2068	\$0.6	\$0.1	\$1.1	\$0.1		\$0.0		\$0.0		\$0.0	\$0.2	\$0.0	\$1.8	\$0.2
2069	\$0.4	\$0.0	\$0.9	\$0.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$1.3	\$0.1
2070	\$0.2	\$0.0	\$0.8	\$0.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$1.1	\$0.1
2071	\$0.1	\$0.0	\$0.8	\$0.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$1.0	\$0.1
2072	\$0.1	\$0.0	\$0.8	\$0.1		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$0.9	\$0.1
2073	\$0.1	\$0.0	\$0.6	\$0.0		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$0.8	\$0.1
2074	\$0.1	\$0.0	\$0.4	\$0.0		\$0.0		\$0.0		\$0.0	\$0.1	\$0.0	\$0.6	\$0.0
2075	\$0.1	\$0.0	\$0.3	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.4	\$0.0
2076	\$0.0	\$0.0	\$0.2	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.3	\$0.0
2077	\$0.1	\$0.0	\$0.2	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.3	\$0.0
2078	\$0.1	\$0.0	\$0.2	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.3	\$0.0
2079	\$0.0	\$0.0	\$0.1	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.2	\$0.0
2080	\$0.0	\$0.0	\$0.1	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.1	\$0.0
2081	\$0.0	\$0.0	\$0.1	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.1	\$0.0
2082	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2083	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2084	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
2085	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0		\$0.0		\$0.0	\$0.0	\$0.0	\$0.0	\$0.0

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Appendix C: Summary of Claims Filed by Former NFL Players**Table C-1: Summary of Claims Filed by Former NFL Players¹**

Category	Disease/Impairment					Total
	Death w/CTE	Alzheimers	ALS	Parkinsons	Dementia	
Self-Reported (SR)	5	11	1	1	60	78
Diagnosed (D)	11	35	10	4	101	161
None	-	-	-	-	-	4,025
Total	16	46	11	5	161	4264

¹ Includes only those claims that were provided at the time of the analysis. Additional claims have been filed subsequently.

Notes: Self-Reported (SR) cases are those for which the filer identified diseases or impairments in their claim but did not have a medical diagnosis. Diagnosed (D) cases are those files that had a medical diagnosis for the diseases or impairments claimed. Some player's claims have more than one disease/impairment, and therefore could be counted in more than one disease category and therefore the total counts are greater than the number of claimants. Cases listed as Death with CTE represents those cases that were included on the list of CTE cases provided by Plaintiff representatives and were also included in the claims filed. In the model, only the cases of Alzheimer's, ALS, Parkinson's, and Dementia that had a medical diagnosis were used.

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Appendix D: Examples of Life Cycle Modeling of Former NFL Players

The following pages present 14 different hypothetical cases to demonstrate how the life cycle model is applied. These hypothetical cases are:

1. Player diagnosed with Alzheimer's at age 52 who played 3 years.
2. Player diagnosed with Alzheimer's at age 63 who played 5 years.
3. Player who died of natural causes at the age of 77 who played 5 years.
4. Player diagnosed with ALS at age 44 who played 12 years.
5. Player diagnosed with Level 1.5 at 49 and Level 2 at 52 who played 4 years.
6. Player diagnosed with Level 1.5 at 55, progressing to Level 2 at 58, and progressing to Alzheimer's at 71 who played 9 years.
7. Player diagnosed with ALS at age 76 who played 6 years.
8. Player diagnosed with Alzheimer's at age 59 who played 2 years.
9. Player diagnosed with Level 1.5 at age 62, progressing to Level 2 at age 65 who played 5+ years.
10. Player diagnosed with Level 1.5 at age 72, progressing to Level 2 at 75 who played 6 years.
11. Player diagnosed with ALS at age 65 who played 3 years.
12. Player diagnosed with Alzheimer's at age 55 who played 2 years.
13. Player diagnosed with Parkinson's at age 50 who played 5+ years.
14. Player diagnosed with Parkinson's at age 68 who played 4 years.

Disease Diagnosed	Alzheimer's
Age at Diagnosis	52
Years played	3
Year of Compensation	2022
Total Nominal Compensation	\$1,147,289

[illegible][illegible]

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Hypothetical Player Case Profile #2

Disease Diagnosed	Alzheimer's
Age at Diagnosis	63
Years played	5
Year of Compensation	2033
Total Nominal Compensation	\$1,313,577

Life Cycle Modeling For Individual Former NFL Player

Incidence										Outcome					Nominal Compensation	Comments
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Level 2/	Adverse Diagnosis	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's		
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%		N							
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%		N							
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%		N							
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%		N							
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%		N							
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%		N							
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%		N							
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%		N							
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%		N							
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%		N							
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%		N							
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%		N							
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%		N							
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%		N							
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%		N							
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%		N							
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%		N							
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%		N							
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%		N							
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%		N				X		\$1,313,577	Alzheimer's Diagnosed
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%		N	X						
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%		Deceased							Player Deceased

Hypothetical Player Case Profile #3

Disease Diagnosed	Natural Death
Age at Diagnosis	77
Years played	5
Year of Compensation	2053
Total Nominal Compensation	\$0

Life Cycle Modeling For Individual Former NFL Player

Incidence					Outcome					Adverse	
Natural Death		ALS		Suicide	Parkinson's		Alzheimer's	Level 1.5	Level 2/ Diagnosis	Nominal Compensation	Comments
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Level 2/ Diagnosis	Nominal Compensation	Comments	
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%	N			
2015	45	0.3650%	0.0118%	0.0475%	0.0028%	0.0037%	0.0003%	N			
2016	46	0.3970%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%	N			
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%	N			
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%	N			
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%	N			
2020	50	0.4780%	0.0129%	0.0753%	0.0028%	0.0181%	0.0006%	N			
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%	N			
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%	N			
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%	N			
2024	54	0.6320%	0.0126%	0.1088%	0.0028%	0.0680%	0.0010%	N			
2025	55	0.6970%	0.0129%	0.1193%	0.0028%	0.0840%	0.0011%	N			
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%	N			
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%	N			
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%	N			
2029	59	0.9910%	0.0126%	0.1725%	0.0028%	0.1148%	0.0020%	N			
2030	60	1.0800%	0.0119%	0.1891%	0.0028%	0.1233%	0.0023%	N			
2031	61	1.1970%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%	N			
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1377%	0.0028%	N			
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%	N			
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%	N			
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%	N			
2036	66	1.9320%	0.0097%	0.2588%	0.0028%	0.4022%	0.0039%	N			
2037	67	2.1270%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%	N			
2038	68	2.3260%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%	N			
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%	N			
2040	70	2.7650%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%	N			
2041	71	3.0500%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%	N			
2042	72	3.2430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%	N			
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%	N			
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%	N			
2045	75	4.2950%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%	N			
2046	76	4.7150%	0.0128%	0.7288%	0.0028%	1.2215%	0.0084%	N			
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	0.0086%	N			
2048	78	5.7110%	0.0110%	0.9652%	0.0028%	1.5333%	0.0089%	N			
2049	79	6.3050%	0.0131%	1.1187%	0.0028%	1.6889%	0.0091%	N			
2050	80	6.9780%	0.0139%	1.2993%	0.0028%	1.8569%	0.0094%	N			
2051	81	7.7390%	0.0153%	1.4676%	0.0028%	2.0369%	0.0096%	N			
2052	82	8.5960%	0.0152%	1.6123%	0.0028%	2.2602%	0.0099%	N			
2053	83	9.5570%	0.0137%	1.7980%	0.0028%	2.5351%	0.0101%	N			
								</			

Hypothetical Player Case Profile #4

Disease Diagnosed	ALS
Age at Diagnosis	44
Years played	12
Year of Compensation	2014
Total Nominal Compensation	\$5,100,000

Life Cycle Modeling For Individual Former NFL Player

Incidence													
Outcome													
Natural				Adverse				Nominal Compensation					
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5
Adverse Diagnosis [Y/N]													
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%		X				
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%						
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%						
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%						
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%						
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%						
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%						
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%						
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%						
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%						
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%						
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%						
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%	X					
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%						Deceased

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Hypothetical Player Case Profile #5

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	49, 52
Years played	4
Year of Compensation	2019, 2022
Total Nominal Compensation	\$1,147,289

Life Cycle Modeling For Individual Former NFL Player

Incidence										Outcome				
Natural			Parkinson's Alzheimer's					Adverse						
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Level 2/	Diagnosis					
									(Y/N)					
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%			N					
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%			N					
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%			N					
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%			N					
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%			N					
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%			N					
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%		X	Y					
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%			N					
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%		X	Y					
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%			N					
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%			N					
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%			N					
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%			N					
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%			N					
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%			N					
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%			N					
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%			N					
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%			N					
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%			N					
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%			N					
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%			N					
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%			N					
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%			N					
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%			N					
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%			N					
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%			N					
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%			N					
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%			N					
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%			N					
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%			N					
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%			N					
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%			Deceased					

Nominal Compensation	Comments
\$ 729,753	Player Diagnosed with Level 1.5
\$ 417,536	Player Diagnosed with Level 2

Hypothetical Player Case Profile #6

Disease Diagnosed	Level 2 &
Age at Diagnosis	Alzheimer's
Years played	55, 58, 71
Year of Compensation	9
Total Nominal Compensation	2025, 2028, 2041
	\$1,178,981

Life Cycle Modeling For Individual Former NFL Player

Incidence					Outcome				
Natural					Natural			Adverse	
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Level 2/	Diagnosis
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%		N
	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%		N
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%		N
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%		N
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%		N
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%		N
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%		N
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%		N
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%		N
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%		N
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%		N
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%		N
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%		N
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%		N
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%		N
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%		N
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%		N
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%		N
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%		N
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%		N
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%		N
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%		N
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%		N
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%		N
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%		N
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%		N
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%		N
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%		N
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%		N
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7922%	0.0069%		N
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%		N
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%		N
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%		Deceased

Hypothetical Player Case Profile #7

Disease Diagnosed	ALS
Age at Diagnosis	76
Years played	6
Year of Compensation	2046
Total Nominal Compensation	\$2,210,566

Life Cycle Modeling For Individual Former NFL Player

Incidence										Outcome				Adverse	
Natural		ALS		Suicide		Parkinson's		Alzheimer's		Level 1.5		Level 2/ Diagnosis		Comments	
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Level 1.5	Level 1.5	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	(Y/N)
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%								N
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%								N
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%								N
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%								N
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0067%	0.0005%								N
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%								N
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%								N
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%								N
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%								N
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%								N
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%								N
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%								N
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%								N
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%								N
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%								N
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%								N
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%								N
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%								N
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%								N
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%								N
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%								N
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%								N
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%								N
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%								N
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%								N
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%								N
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%								N
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%								N
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%								N
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%								N
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%								N
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%								N
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%	0.0084%								Y
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	0.0086%								
2048	78	5.7110%	0.0131%	0.9652%	0.0028%	1.5332%	0.0089%								N
2049	79	6.3050%	0.0131%	1.1187%	0.0028%	1.6889%	0.0091%								N
2050	80	6.9780%	0.0139%	1.2993%	0.0028%	1.8569%	0.0094%								N
2051	81	7.7380%	0.0155%	1.4467%	0.0028%	2.0369%	0.0096%								N
2052	82	8.5960%	0.0152%	1.6123%	0.0028%	2.2602%	0.0099%								Deceased
															Player diagnosed with ALS
															\$2,210,566

Disease Diagnosed	Alzheimer's
Age at Diagnosis	59
Years played	2
Year of Compensation	2029
Total Nominal Compensation	\$587,552

Life Cycle Modeling For Individual Former NFL Player

59

Privileged and Confidential

Hypothetical Player Case Profile #9

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	62, 65
Years played	5+
Year of Compensation	2032, 2035
Total Nominal Compensation	\$710,996

Life Cycle Modeling For Individual Former NFL Player

Incidence								Outcome						
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Adverse Diagnosis
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N
2021	51	0.5040%	0.0122%	0.0825%	0.0028%	0.0258%	0.0007%							N
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%				X			Player diagnosed with Level 1.5
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%				X			Player diagnosed with Level 2
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%							
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%							
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%	0.0058%							
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%							
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%							
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%	0.0075%							
2045	75	4.2990%	0.0123%	0.6295%	0.0028%	1.0630%	0.0082%	X						Player deceased from natural cause

Hypothetical Player Case Profile #10

Disease Diagnosed	Level 1.5 & 2
Age at Diagnosis	72, 75
Years played	6
Year of Compensation	2042, 2045
Total Nominal Compensation	\$248,759

Life Cycle Modeling For Individual Former NFL Player

		Incidence					Outcome					Adverse Diagnosis Level 2/ Level 1.5 (Y/N)	Nominal Compensation	Comments
Year	Age	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's Level 1.5	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's Level 1.5			
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%						N		
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%						N		
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%						N		
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%						N		
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%						N		
2019	49	0.4570%	0.0130%	0.0667%	0.0028%	0.0125%						N		
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%						N		
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%						N		
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%						N		
2023	53	0.5800%	0.0135%	0.0992%	0.0028%	0.0500%						N		
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%						N		
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%						N		
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%						N		
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%						N		
2028	58	0.9060%	0.0129%	0.1573%	0.0028%	0.1137%						N		
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%						N		
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%						N		
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%						N		
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%						N		
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%						N		
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%						N		
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%						N		
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%						N		
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%						N		
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%						N		
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%						N		
2040	70	2.7850%	0.0096%	0.3321%	0.0028%	0.6032%						N		
2041	71	3.0590%	0.0101%	0.3739%	0.0028%	0.6409%						N		
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%					X	Y	\$186,464	Player diagnosed with Level 1.5
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%						N		
2044	74	3.9420%	0.0117%	0.5493%	0.0028%	0.9205%						N		
2045	75	4.2990%	0.0127%	0.6295%	0.0028%	1.0630%					X	Y	\$62,296	Player diagnosed with Level 2
2046	76	4.7150%	0.0126%	0.7238%	0.0028%	1.2215%						N		
2047	77	5.1840%	0.0132%	0.8347%	0.0028%	1.3765%	X					N		
2048	78	5.7110%	0.0110%	0.9652%	0.0028%	1.5332%						Deceased		Player deceased from natural cause

Hypothetical Player Case Profile #11

Disease Diagnosed	ALS
Age at Diagnosis	65
Years played	3
Year of Compensation	2035
Total Nominal Compensation	\$2,504,487

Life Cycle Modeling For Individual Former NFL Player

Incidence										Outcome				
Natural				Parkinson's				Alzheimer's		Adverse				
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Natural Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5	Adverse
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%							N
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%							N
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%							N
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%							N
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%							N
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%							N
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%							N
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%							N
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%							N
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%							N
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%							N
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%							N
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%							N
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%							N
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%							N
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%							N
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%							N
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%							N
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%							N
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%							N
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%							N
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%							N
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%		X					Y
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%							N
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%							N
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%							Deceased

Nominal Compensation	Comments

Directed Connected

Hypothetical Player Case Profile #12

Disease Diagnosed	Alzheimer's
Age at Diagnosis	55
Years played	2
Year of Compensation	2025
Total Nominal Compensation	\$674,705

Life Cycle Modeling For Individual Former NFL Player

Year		Age		Natural		Incidence				
		Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5			
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%			
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%			
2016	46	0.3920%	0.0125%	0.0521%	0.0028%	0.0051%	0.0004%			
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0053%	0.0004%			
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%			
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%			
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%			
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%			
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%			
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%			
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%			
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%			
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%			
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%			
2028	58	0.9060%	0.0122%	0.1573%	0.0028%	0.1137%	0.0017%			
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%			

Outcome					
Natural Death	ALS	Suidice	Parkinson's Alzheimer's	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)
					N
					N
					N
					N
					N
					N
					N
					N
					N
					N
					N
					N
					N
				X	Y
					N
					N
					N
X					N

Nominal Compensation	Comments
\$674,705	Player diagnosed with Alzheimer's
	Player deceased from natural cause

Privileged and Confidential

Hypothetical Player Case Profile #13

Disease Diagnosed	Parkinson's
Age at Diagnosis	50
Years played	5+
Year of Compensation	2020
Total Nominal Compensation	\$2,444,288

Life Cycle Modeling For Individual Former NFL Player

Incidence										Outcome					Nominal Compensation	Comments
Year	Age	Natural Death	ALS	Suicide	Parkinson's Alzheimer's Level 1.5	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Natural Death	ALS	Suicide	Parkinson's Alzheimer's Level 1.5	Level 2/ Level 1.5	Adverse Diagnosis (Y/N)	Natural Death		
2014	44	0.3350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%						N			
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%						N			
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%						N			
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0048%	0.0004%						N			
2018	48	0.4380%	0.0129%	0.0626%	0.0028%	0.0087%	0.0005%						N			
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%						N			
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%				X		Y		\$2,444,288	Player diagnosed with Parkinson's
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%						N			
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%						N			
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%						N			
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%						N			
2025	55	0.6910%	0.0122%	0.1195%	0.0028%	0.0840%	0.0011%						N			
2026	56	0.7570%	0.0133%	0.1308%	0.0028%	0.0978%	0.0013%						N			
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%						N			
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1175%	0.0017%						N			
2029	59	0.9910%	0.0122%	0.1725%	0.0028%	0.1143%	0.0020%						N			
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.1233%	0.0023%						N			
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%						N			
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%						N			
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%						N			
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%						N			
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%						N			
2036	66	1.9320%	0.0097%	0.2589%	0.0028%	0.4022%	0.0039%						N			
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%	X					N			
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5224%	0.0046%						Deceased			Player deceased from natural causes

Hypothetical Player Case Profile #14

Natural				Incidence			
Year	Age	Death	ALS	Suicide	Parkinson's	Alzheimer's	Level 1.5
2014	44	0.350%	0.0115%	0.0433%	0.0028%	0.0057%	0.0003%
2015	45	0.3630%	0.0118%	0.0475%	0.0028%	0.0057%	0.0003%
2016	46	0.3920%	0.0129%	0.0521%	0.0028%	0.0051%	0.0004%
2017	47	0.4180%	0.0120%	0.0571%	0.0028%	0.0058%	0.0004%
2018	48	0.4380%	0.0128%	0.0626%	0.0028%	0.0087%	0.0005%
2019	49	0.4570%	0.0130%	0.0687%	0.0028%	0.0125%	0.0005%
2020	50	0.4780%	0.0122%	0.0753%	0.0028%	0.0181%	0.0006%
2021	51	0.5040%	0.0132%	0.0825%	0.0028%	0.0258%	0.0007%
2022	52	0.5380%	0.0127%	0.0905%	0.0028%	0.0362%	0.0008%
2023	53	0.5800%	0.0133%	0.0992%	0.0028%	0.0500%	0.0009%
2024	54	0.6320%	0.0125%	0.1088%	0.0028%	0.0680%	0.0010%
2025	55	0.6910%	0.0122%	0.1193%	0.0028%	0.0840%	0.0011%
2026	56	0.7570%	0.0133%	0.1306%	0.0028%	0.0978%	0.0013%
2027	57	0.8280%	0.0123%	0.1435%	0.0028%	0.1079%	0.0015%
2028	58	0.9060%	0.0123%	0.1573%	0.0028%	0.1137%	0.0017%
2029	59	0.9910%	0.0122%	0.1751%	0.0028%	0.1143%	0.0020%
2030	60	1.0860%	0.0113%	0.1891%	0.0028%	0.0023%	0.0023%
2031	61	1.1920%	0.0104%	0.1982%	0.0028%	0.1341%	0.0025%
2032	62	1.3110%	0.0095%	0.2082%	0.0028%	0.1577%	0.0028%
2033	63	1.4440%	0.0102%	0.2192%	0.0028%	0.1989%	0.0030%
2034	64	1.5900%	0.0102%	0.2312%	0.0028%	0.2643%	0.0033%
2035	65	1.7530%	0.0095%	0.2444%	0.0028%	0.3320%	0.0036%
2036	66	1.9320%	0.0097%	0.2585%	0.0028%	0.4022%	0.0039%
2037	67	2.1220%	0.0087%	0.2747%	0.0028%	0.4674%	0.0042%
2038	68	2.3230%	0.0102%	0.2921%	0.0028%	0.5242%	0.0046%
2039	69	2.5380%	0.0097%	0.3112%	0.0028%	0.5629%	0.0049%
2040	70	2.7850%	0.0098%	0.3321%	0.0028%	0.6032%	0.0053%
2041	71	3.0590%	0.0101%	0.3795%	0.0028%	0.6409%	0.0058%
2042	72	3.3430%	0.0105%	0.4232%	0.0028%	0.7023%	0.0063%
2043	73	3.6330%	0.0107%	0.4811%	0.0028%	0.7932%	0.0069%

Hypothetical Player Case Profile #14

Disease Diagnosed	Parkinson's
Age at Diagnosis	68
Years played	4
Year of Compensation	2038
Total Nominal Compensation	\$922,546

Outcome						Adverse
Natural Death	ALS	Suicide	Parkinson's	Alzheimer's Level 1-5	Level 2/ Diagnosis (Y/N)	
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
						N
				X		Y
						N
						N
						N
						N
						N
						N
X						Deceased

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Appendix E: List of Deceased Former NFL Players with CTE

List of Deceased Former NFL Players, Death with CTE (2000 - 2013)

<u>Player Case No.</u>	<u>Year of Death</u>	<u>Seasons</u>	<u>Age at Death</u>	<u>Co-morbidity</u>	<u>Filed Plaintiff</u>
1	2002	17	50		No
2	2004	9	36		No
3	2005	8	45		No
4	2006	12	44		Yes
5	2008	10	45		Yes
6	2008	16	66	ALS (cause of death)	Yes
7	2008	9	45		Yes
8	2009	10	82		No
9	2009	11	38		Yes
10	2009	5	26		No
11	2009	2	64		Yes
12	2009	1	75	AD	Yes
13	2009	1	49	ALS	Yes
14	2010		86		No
15	2010	10	78		Yes
16*	2010	3	36		No
17	2010	15	71		No
18	2010	7	98		No
19	2010	7	56		Yes
20	2010	1	47		No
21	2010	1	23		No
22*	2010	1	87		No
23	2011	5	73		No
24	2011	11	65		Yes
25	2011	6	69		Yes
26	2011	11	50		Yes
27	2011	8	67	ALS (2000)	Yes
28	2011	6	75		No
29	2011	13	81		No
30	2011	6	77		Yes
31	2011	2	56		Yes
32*	2011		74		No
33	2011	10	69	Dementia	Yes
34	2011	15	80	Dementia	Yes
35	2011	16	84	Dementia	No
36	2012	0.5	52	ALS (2002)	No
37*	2012				No
38	2012	8	62		Yes
39	2012	8	52		No
40	2012	2	56		Yes
41	2012	1	25		No
42	2012	21	43		Yes
43	2012	8	69	Dementia	Yes
44	2012	9	78		No
45	2012	8	61	Dementia	Yes
46	2013	1	30		No
47	2013	6	70		No
48	2013	9	75		Yes
49	2012	10	68		Yes
50	2008	7	52		No

*Player data could not be matched to player database and no secondary confirmation of NFL affiliation could be found and therefore was not included in the analysis.

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Appendix F: CV of Thomas Vasquez Ph.D.

Dr. Vasquez is a vice president at Analysis, Research, Planning Corporation (ARPC) in the New York office. Dr. Vasquez has over 35 years of experience in management consulting for private sector clients, the development of economic models for US and foreign governments to analyze and develop tax, expenditure and regulatory policy and providing expert testimony over a wide range of issues.

Dr. Vasquez has provided management consulting services for private sector companies in a wide array of industry sectors. The services include identifying methods to: (1) increase the stock price or value of the company; (2) leverage the firm's brand asset; (3) assist underperforming companies and (4) provide general valuation services.

Dr. Vasquez has assisted US and foreign governments in the development of tax, expenditure and regulatory policy. The services include the development of large scale micro-economic models to allow policymakers to determine individual and company behavioral reactions to tax and regulatory policy.

Dr. Vasquez has provided expert testimony, depositions and analytical litigation support on a broad spectrum of issues involving statistical techniques, computer simulation, economic behavior and economic models, including, among others:

- Using statistical models to forecast a company's future liability from lawsuits related to its former production of asbestos including the following representative assignments – National Gypsum Corporation, the Fibreboard Corporation, Owens Corning, Congoleum, Western MacArthur, Burns and Roe, Inc. and Specialty Products Holding Corp.,
- Using statistical models to forecast a company's future liability from lawsuits related to its former sales of insurance products.
- The statistical analysis of the determinants of supply and demand in certain industry segments for use in business valuations before the Bankruptcy Court.
- The impact of regulation and tax policy on prices, sales and production.
- Analyzing the allocation of liability from a state's superfund tax.
- The statistical analysis of reasonable officer compensation levels in closely held companies.

Prior to joining ARPC, Dr. Vasquez was president and CEO of Yankelovich Partners, Inc., a leading market research firm. While at Yankelovich Partners, Dr. Vasquez had responsibility for engagements designed to determine the best approach to maximize the value of the client's firm. These engagements involved understanding the source of the value components of the firm – value of the firm's brand, product/service lines responsible for increasing (decreasing) stock price, the role of joint products and other key components of the firm's value.

From 1993 to 1997, Dr. Vasquez was the National Partner in Charge of Corporate Transactions Services for KPMG Peat Marwick. In this role he practiced in and led four of KPMG's national practices. One practice area was in the area of litigation support. This area involved almost exclusively the use of highly trained professionals in providing expert testimony in a wide range

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of litigation issues. The second practice area involved providing consulting services in the bankruptcy and troubled company area. This area involved analyzing the condition and prospects of a company in financial distress, generally involving recommendations for expense control, revenue growth, elimination/sale of product and distribution lines and the elimination/selling of production sites. The third area is investment banking. This area focused on three major components: (1) buying and/or selling of companies for middle market clients; (2) advise to non-public clients preparing an Initial Public Offering, and (3) advise to clients on methods to increase share price and/or cash flow in anticipation of sale. The fourth area was business valuation. This area focused on the valuation of businesses in a wide range of settings including bankruptcy, fairness opinions, mergers and acquisitions, estate planning and other venues requiring valuation services.

Dr. Vasquez served on the Firm's Board of Directors from 1993 to 1997 and served as the Chairman of the Board's Strategic Planning Committee.

Prior to selling his firm to KPMG, Dr. Vasquez was the founder and President of the Policy Economics Group. Dr. Vasquez was responsible for all data base development and tax simulation modeling for federal and state government clients in the United States as well as foreign governments including among others Egypt, Pakistan, Hungary, the former Soviet Union, Trinidad-Tobago, Virgin Islands, Guam, El Salvador and Guatemala. Dr. Vasquez also developed similar models using specialized industry data bases to determine tax impacts and behavioral responses for commercial firms, industry associations and law firms. These models were also used to formulate the client's strategic direction, market initiatives and value maximization strategies.

Prior to establishing the Policy Economics Group, Dr. Vasquez was the Deputy Director for the U.S. Department of the Treasury Office of Tax Analysis. While there, he guided U.S. tax policy analysis and designed large micro-simulation models and data bases for the U.S. Treasury Department and the Joint Tax Committee of the U.S. Congress. He appeared before Congress to provide testimony on such issues as capital gains taxation. He also designed numerous specialized models and data bases for analyzing policy issues at the company, industry, and individual levels.

Professional Experience:

President and CEO, Yankelovich Partners Inc., 1997 to 1999

National Partner in Charge, Corporate Transactions Services, KPMG Peat Marwick, 1993 to 1997.

Managing Partner, Policy Economics Group, KPMG Peat Marwick, 1987 to 1993.

Founder and President, Policy Economics Group, 1983 to 1987.

Deputy Director, Office of Tax Analysis, U.S. Department of the Treasury, 1979 to 1983.

Assistant Director, 1978 to 1979; Fiscal Economist, 1972 to 1976.

Chief Economist, New York State Economic Development Board, 1977 to 1978.

Staff Economist, Congressional Joint Committee on Taxation, 1976.

Staff Economist, American Enterprise Institute for Public Policy Research, 1972.

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Education:

Ph.D., Economics, Clark University, 1973.

M.A., Economics, Clark University, 1972.

B.S., Mathematics, State University of New York - Potsdam, 1970.

Legal Experience and Testimony:

National Gypsum Company Bankruptcy Proceedings, 1991

Deposition

Testimony

Gerald Ahern, et. al. vs. Fiberboard Corporation, et. al., 1994

Deposition

Testimony

Ezell Thomas, et. al. vs. R.J. Reynolds Tobacco Company, et. al., 1999

Deposition

Fiberboard Corporation and Owens Corning vs. R.J.Reynolds Tobacco Company, et. al., 1999

Deposition

Western Mac Arthur Company and Mac Arthur Company vs. General Accident Insurance Co. of America; United States Fidelity & Guaranty Co.; Argonaut Insurance Company, 1999

Affidavit

CSX Transportation, Inc. and American Home Ins. Co., 2000

Deposition

ADR Proceeding Celotex vs. Travelers Casualty and Surety Co. and London Market Insurers, 2000

Deposition, 2004

Testimony, 2004

Owens Corning Bankruptcy Proceedings, 2001

Deposition, 2004

Trial Testimony, 2005

Michael Albanese vs. Compaq Computer Corporation, 2002

Affidavit

ADR Proceeding ACandS, Inc. vs. Travelers Casualty and Surety Co., 2003

ASARCO vs

Deposition, 2003

Western Mac Arthur Company and Mac Arthur Company Bankruptcy Proceedings, 2003

Oglebay Norton Bankruptcy Proceedings, 2004

Deposition, 2004

Trial Testimony, 2004

Halliburton Bankruptcy Proceedings, 2004

Congoleum vs Ace Ins. Et al, 2005

Deposition, 2005

Trial Testimony, 2006

Gene B. Griego, et al., Plaintiffs, vs. Bechtel National, Inc. et al., Defendants

Deposition, 2005

Sandra Sue Fullen, et al, Plaintiffs v. Philips Electronics North America Corporation, a Delaware corporation, et al., Defendants

Deposition, 2005

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St. Paul Fire and Marine Insurance Company, Plaintiff, vs. A.P.I., Inc., Defendant and Counter-Claimant

Deposition, 2005

Dana Corporation Bankruptcy Proceedings, Case No. 06-10354(BLR), 2007

Deposition, 2007

Trial Testimony, 2007

API, INC. Asbestos Settlement Trust v. Atlantic Mutual Insurance Company; Civil No. 09-0665 (JRT/JJG); United States District Court, D. Minnesota; July 9, 2010.

Deposition, 2010

Applebee's International, Inc., DineEquity, Inc. and Weight Watchers International, Inc. Sheree Shepard and Anthony Watts, On Behalf of Themselves and All Others Similarly Situated vs. DineEquity, Inc. et al.; United States District Court; District of Kansas; No. 08-cv-2416.

Deposition, 2010

API, Inc. Asbestos Settlement trust, et al. v. Zurich American Insurance Company, et al. Court File No. 09-CV-975 (JRT/JJG)

Deposition, March 29, 2011

Tronox Incorporated, Tronox Worldwide, LLC f/k/a; Kerr-McGee Chemical Worldwide LLC, and Tronox, LLC, f/k/a Kerr-McGee Chemical LLC vs. Anadarko Petroleum Corporation and Kerr-McGee Corporation

Deposition 2012

Specialty Products Holding Corp., et al Bankruptcy proceedings, Case No. 10-11780(JFK), 2012

Deposition, 2012

Trial Testimony, 2013



Exhibit A-1

Amendment to the Vasquez Report
(See attached)

**UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA**

IN RE: NATIONAL FOOTBALL
LEAGUE PLAYERS' CONCUSSION
INJURY LITIGATION

No. 2:12-md-02323-AB

MDL No. 2323

Hon. Anita B. Brody

Kevin Turner and Shawn Wooden,
*on behalf of themselves and
others similarly situated,*

Civ. Action No. 14-00029-AB

Plaintiffs,

v.

National Football League and
NFL Properties LLC,
successor-in-interest to
NFL Properties, Inc.,

Defendants.

THIS DOCUMENT RELATES TO:
ALL ACTIONS

DECLARATION OF CHRISTOPHER A. SEEGER

CHRISTOPHER A. SEEGER declares, pursuant to 28 U.S.C. § 1746, based upon his personal knowledge, information and belief, the following:

1. I am Court-appointed Co-Lead Class Counsel for the Settlement Class that this Court certified in its Amended Final Order and Judgment entered on May 8, 2015 (ECF No. 6534) in accordance with its April 22, 2015 decision (ECF No. 6509) granting final approval to the February 13, 2015 Class Action Settlement Agreement, as amended (ECF No. 6481-1). I am fully familiar with the matters set forth herein, which are based on my personal knowledge and review

of my firm's files. I submit this Declaration in response to the Expert Report of Professor William B. Rubenstein filed on December 11, 2017 (ECF No. 9526).

2. My firm regularly receives updated reports from the Court-appointed Claims Administrator, BrownGreer, PLC, concerning Settlement program monetary award claims processing data.

3. Based on my review of such reports, as of December 19, 2017, 1,542 claims for monetary awards had been submitted, and the Claims Administrator had approved some 202 awards, amounting to nearly \$254 million before liens or other withholdings, with 63 awards (totaling nearly \$75 million) already paid and the remainder either awaiting the Court's approval of funding, the subject of appeal or audit, or still within the appeal deadline. The more than 1,300 other claims were in various stages of processing, including denials (60 claims), claims awaiting the Claims Administrator's review, claims the subject of audit, claims requiring that the Class Member respond to a request for additional information, and the Claims Administrator reviewing responses to additional information requests.

4. In addition, as of December 31, 2017, the NFL had filed 25 appeals of monetary award determinations. The appeal deadline had yet to expire on 32 monetary award decisions.

5. Among the Settlement Agreement implementation-related disputes with the NFL that I and my firm have been addressing is the issue of how to resolve the opposition of physicians who participate in the Collective Bargaining Agreement's so-called "88 Plan" to signing Diagnosing Physician Certifications (a form required as part of a monetary award claim package). We are seeking to allow a Retired NFL Football Player with an 88 Plan diagnosis to be either independently examined by a Qualified MAF Physician or to have his medical records reviewed by a member of the Appeals Advisory Panel, with his date of diagnosis related back to the date of

diagnosis for 88 Plan purposes. The issue of how to accommodate 88 Plan diagnoses is presently before Special Master Verrier for resolution.

6. Another dispute with the NFL has been over what diagnostic criteria satisfy the pre-Effective Date “generally consistent” language in Section 6.4(b) and Exhibit A-1 of the Settlement Agreement relating to Qualifying Diagnoses for purposes of demonstrating Level 1.5 and Level 2 Neurocognitive Impairment. *See* ECF No. 6481-1, at 37, 106-08. The NFL has argued that the impairment levels that drive the BAP, which are narrow, should guide, whereas I maintain that a more generous and inclusive standard, the “dementia” diagnosis, should guide. We have submitted statements to the Special Masters on this issue in support of individual Class Members in connection with appeals of monetary award determinations.

7. The foregoing are just are two of many disputed issues between the Settling Parties as to the implementation of the Settlement Agreement that have required negotiation or resolution of one form or another.

8. Annexed hereto as Exhibit “A” is a report, dated January 3, 2018 and entitled “An Updated Analysis of the NFL Concussion Settlement,” prepared by Thomas Vasquez, Ph.D. of Ankura Consulting Group. The data set forth in paragraph 3 above concerning the number of approved monetary awards and the dollar value thereof were furnished to Dr. Vasquez.

9. I declare under penalty of perjury that the foregoing is true and correct.

Executed this 3rd day of January, 2018

/s/ Christopher A. Seeger
CHRISTOPHER A. SEEGER
Co-Lead Class Counsel

EXHIBIT A

AN UPDATED ANALYSIS OF THE NFL
CONCUSSION SETTLEMENT

Prepared by:
Thomas Vasquez Ph.D.
Ankura Consulting Group
January 3, 2018

I was originally asked by Co-Lead Class Counsel in *In re National Football League Players' Concussion Injury Litigation*, MDL No. 2323 (E.D. Pa.) to undertake an analysis to assist in settlement negotiations in mid-2013. My conclusions from that work are reflected in the NFL Concussion Liability Forecast, dated February 10, 2014. In late 2014, Co-Lead Class Counsel asked me to prepare a Declaration and to elaborate on certain elements of the work I had conducted for my initial report. A discussion of those analyses is contained in my Declaration, dated November 12, 2014. In April of 2017, I provided updated analyses to reflect changes to the initial settlement agreement and additional data concerning Class Member participation rates. A discussion of those analyses is contained in my report, dated April 10, 2017.¹

I have now been asked by Co-Lead Class Counsel to address certain aspects of the analysis conducted by Professor William B. Rubenstein. Professor Rubenstein computes a measure to show the percent of the settlement value accruing to Class Counsel. He computes the percent by dividing total Class Counsel "Fees" by the Net Present Value of the sum of: (1) payments made to claimants from the MAF, (2) cost of the BAP, (3) the Education Fund, (4) Notice Costs, (5) Claims Administration, and (6) Class Counsel "Fees". I have been asked to determine whether current information on the Class participation rate, actual payments from the MAF fund, and actual administration costs would affect the Net Present Value calculations at the core of Professor Rubenstein's ultimate conclusions.

Current information, as of December 19, 2017, on participation rates—and, relatedly, actual claimant awards and administrative expenses—reveals that the Net Present Value of the Settlement is substantially greater than the value accorded the Settlement by Professor Rubenstein. Participation rate assumptions in my (and the NFL's) original modeling of the Settlement were a primary driver of expected settlement value. Participation rates in the final, as-approved Settlement program substantially exceed those initially projected (and likewise exceed those for reference settlements considered in developing my early settlement estimates). As a result, the anticipated Net Present Value is expected to be substantially greater than previously projected. The actual claimant awards and administrative expenses incurred to date similarly point to higher Settlement-related payments and costs, and a correspondingly higher Net Present Value.

While a relatively small impact when compared to the impact of recent information, Professor Rubenstein also includes expense reimbursements to Class Counsel as a component of "Attorney Fees" in measuring fees to Class Counsel, which serves to overstate Class Counsel's fee percentage.

Table 1 provides a summary of the value of the Settlement as estimated by Professor Rubenstein and as updated for actual participation rates and actual spending patterns. Professor Rubenstein's analysis relies heavily on the estimates prepared in 2014 by the NFL actuaries. Indeed, Professor Rubenstein's nominal amounts are taken directly from the report of the Segal Group to the

¹ All three of these documents have been provided earlier and are not reproduced here.

Special Master.² Professor Rubenstein reports total nominal value at \$1,088.5 million and Net Present Value (NPV) at \$720.5 million. He then concludes that this results in Attorney's Fees being approximately 15.6% of total Settlement value (\$112.5 million divided by \$720.5 million).

However, the \$112.5 million represented as Attorney Fees includes a request for reimbursement of expenses incurred by Class Counsel prior to the Effective Date of approximately \$5.7 million. Actual pre-Effective Date Class Attorneys' Fees are therefore \$106.8 million. The third column of the table shows the effect of eliminating expenses. As seen on the Table, without consideration of the impact of actual participation rates on Net Present Value, Attorney Fees are 14.8% of the value of the Settlement.

Of greater significance, as noted above, is the impact of actual Class Member participation rates on the total value of the Settlement. As noted in my original report, the participation rate of eligible Class Members in the Settlement is a critical parameter in valuing the Settlement. *See* NFL Concussion Liability Forecast, dated February 10, 2014, at p. 9. Based on experience with participation rates in other mass tort resolutions, both the NFL actuaries (Segal Group) and I projected Class Member participation to be approximately 60% in the analyses prepared in 2014. Participation rates are now known to be approximately 80%--much higher than forecasted, and much greater than that seen in other similar mass torts (see Table 2 below).

Table 1 also presents the valuation presented by Professor Rubinstein as updated to account for final participation rates, changes in settlement terms subsequent to the initial valuations³ and appropriate treatment of Attorneys' Fees (*i.e.*, net of requested pre-Effective Date expense reimbursement). After appropriately accounting for these items, the nominal value of the settlement increases by approximately 39% and the NPV increases by approximately 36%.

Thus, while maintaining Professor Rubenstein's framework but with the change of accounting for increases in the value of the settlement and the excluding of Class Counsel's out-of-pocket expenses, Class Attorneys' Fees represent 10.9% of the total settlement value – almost 5 percentage points, or 30% lower than concluded by Professor Rubenstein.

² "Report of the Segal Group to Special Master Perry Golkin"; In re: National Football League Player's Concussion Injury Litigation, MDL 2323; September 12, 2014.

³ As reflected in my April 2017 report, the specific changes in benefits and eligibility implemented in the final Settlement Agreement (from that which was initially presented) have increased the value of the Settlement to Class Members by approximately \$33 million.

Table 1

**Updating Professor Rubenstein's Net Present Value Calculations:
Accounting for Current Participation Rates and Spending Levels**

Estimate	NFL Actuary's Nominal	Net Present Value Using Rubenstein's 4.5% Discount Rate	
		All Attorney's Fees Including Expenses	Attorney's Fees Excluding Expenses
Professor Rubenstein's Calculations			
Monetary Award Fund (MAF)	\$890,000,000	\$537,000,000	\$537,000,000
Baseline Assessment Program (BAP)	\$62,000,000	\$51,000,000	\$51,000,000
Education Fund	\$10,000,000	\$10,000,000	\$10,000,000
Notice Costs	\$4,000,000	\$4,000,000	\$4,000,000
Claims Administration	\$10,000,000	\$6,000,000	\$6,000,000
Attorney's Fee Provision			
Attorney Fees	\$106,800,000	\$106,800,000	\$106,800,000
Expenses	\$5,700,000	\$5,700,000	\$5,700,000
Subtotal, Attorney's Fee Provision	\$112,500,000	\$112,500,000	\$112,500,000
Total	\$1,088,500,000	\$720,500,000	\$720,500,000
Rubenstein's Attorney's Fee Provision (% of Total)	10.3%	15.6%	14.8%
Professor Rubenstein's Calculations Updated for Current Participation Rate			
Monetary Award Fund (MAF)	\$1,297,000,000	\$785,000,000	\$785,000,000
Baseline Assessment Program (BAP) ¹	\$75,000,000	\$61,700,000	\$61,700,000
Education Fund	\$10,000,000	\$10,000,000	\$10,000,000
Notice Costs	\$4,000,000	\$4,000,000	\$4,000,000
Claims Administration ²	\$14,000,000	\$9,000,000	\$9,000,000
Attorney's Fee Provision			
Attorney Fees	\$106,800,000	\$106,800,000	\$106,800,000
Expenses	\$5,700,000	\$5,700,000	\$5,700,000
Subtotal, Attorney's Fee Provision	\$112,500,000	\$112,500,000	\$112,500,000
Total	\$1,512,500,000	\$982,200,000	\$982,200,000
Rubenstein's Updated Attorney's Fee Provision (% of Total)	7.4%	11.5%	10.9%

1.) Includes administrative costs associated with BAP

2.) MAF administrative costs only.

Note: Updated Calculations include the effect of increased participation rates and expanded settlement coverage

(see Vasquez Report "An Updated Analysis of the NFL Concussion Settlement", April 10, 2017)

Methodology

The methodology used in my original analysis in 2014 and all subsequent analyses was based on a life cycle forecasting model. The life cycle model looks at each individual in the population of former NFL players and "ages" them, year-by-year, into the future. The population utilized was based upon the anticipated participation rate.

During the aging process, the life cycle model takes each of the former NFL players individually

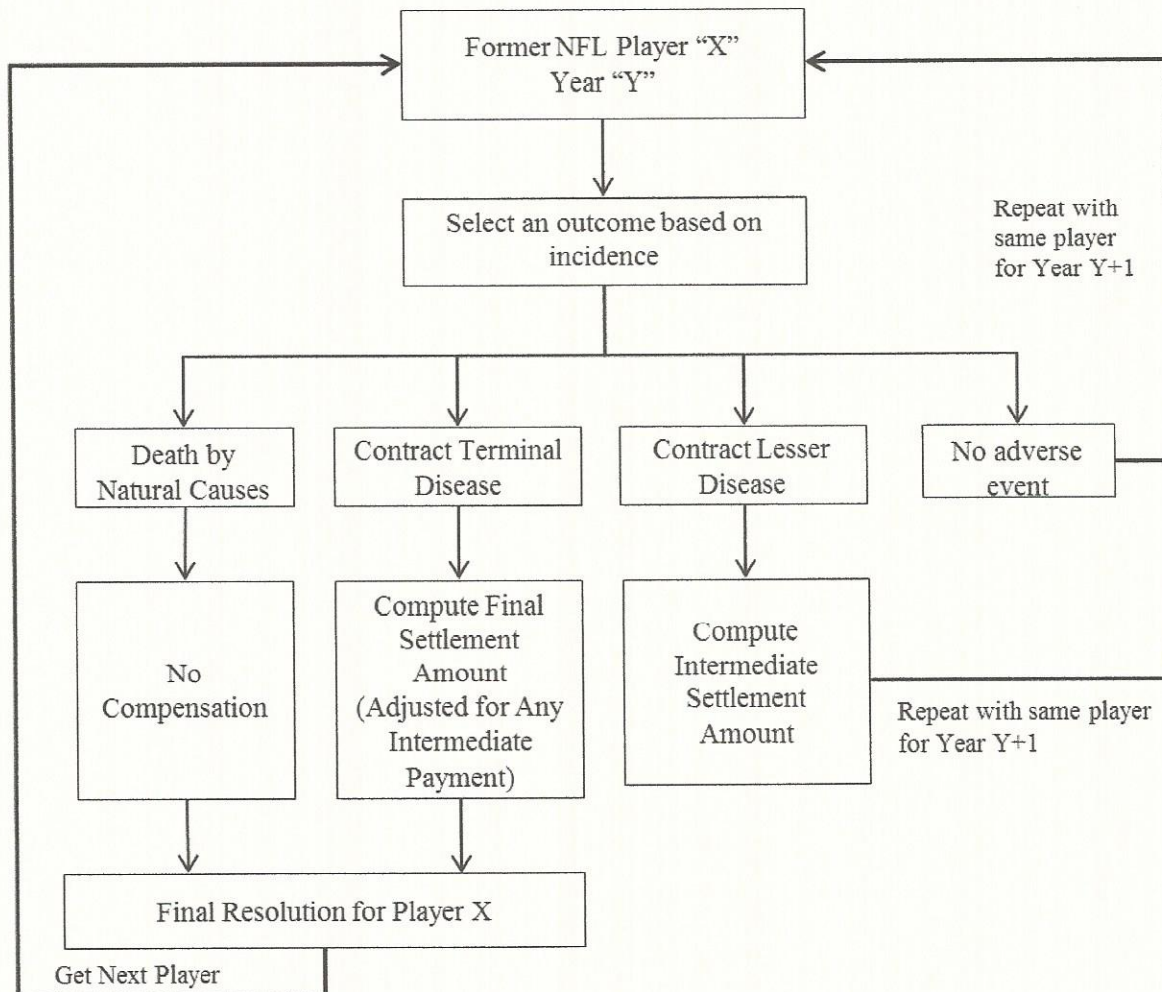
and first applies the epidemiological risk equations to compute the probability of contracting each one of the compensable injuries. The model then applies overall mortality rates to compute the likelihood of death due to other natural causes⁴. The mortality rates used to compute the likelihood of death due to natural causes are those for all causes for males in the same age group.

Thus, for each player and for each year, computations are made based on the probabilities of each of the following: (1) the player will die of natural causes, (2) he will be diagnosed with one of the compensable terminal diseases (Alzheimer's, ALS, Parkinson's), (3) he will be diagnosed with one of the non-terminal neurocognitive disorders (Level 1.5 or 2), and (4) he will not experience any of these adverse conditions during that year.

These steps are repeated year-by-year, changing the mortality rates and disease incidence rates accordingly for age until the individual player reaches a final resolution – either he dies of natural causes or he is diagnosed with one of the terminal diseases and receives full final compensation. The model then repeats this entire process for the next player until all players in the population have reached the final resolution stage, and the last member of the population of former NFL players is no longer alive.

A diagram of the life cycle modeling methodology is shown in Figure 1.

⁴ The term “natural causes” refers to any cause of death that is not identified as a compensable disease in the Settlement.

Figure 1: Life Cycle Methodology Overview

The methodology employed by the NFL's actuaries in their 2014 analysis (and on which Professor Rubinstein relies) similarly depends on and is driven by the participation rate. The more Class Members that participate in the Settlement, the greater the number that are eligible for injury-related compensation and will be compensated according to the Settlement Agreement's terms over the life of the Program.

Updates to 2014 Estimates

The updated value of the NFL Concussion Settlement includes two factors/updated information that changed since my original estimate in 2014. The first includes changes to the settlement. This factor was addressed in my April 2017 report. To summarize, I concluded that the nominal value of the MAF award program would increase by approximately 5%.

The second factor is the participation rate in the MAF program.⁵ Table 2 shows the estimated and

⁵ There was some indication of an increased participation rate at the time I was preparing my April 2017 report.

actual participation rates. The original estimates assumed a 95% participation rate for individuals already filing a claim (and/or represented by counsel) and a 50% participation rate for all other former players. These assumptions yielded an approximately 59% participation rate overall. However, the actual participation rate is approximately 80%. This 36% increase in the participation rate (from 59% to 80%) has a direct increase in the value of the MAF and BAP.

Table 2

Player Registrations as Class Members: Estimated vs. Actual

Player Categories	Original NFL Actuary - 2014	Final Registration
	Estimate	
Estimated Registered Players ^a	12,200	17,200
Total Class Members ^b	20,500	21,500
Participation Rate	59%	80%

a.) Ex. A; Declaration of Orran L. Brown, Sr. ISO Third Joint Status Report on the Implementation of the Settlement Program; Paragraph 5, (excludes Derivative Claimants.)

b.) Players of NFL affiliate leagues were included as eligible class members in my April, 2017 report

While it is intuitively obvious that higher participation rates will increase the value of the settlement, there is growing substantial evidence that the higher rates are already yielding higher value. Indeed, as shown on Table 3, costs are already on average 57% higher than estimated. This compares to the 39% increase in forecasted nominal costs resulting from the higher participation rates (see Table 1 above). Table 3 compares actual and estimated costs through the first eight months of the settlement.⁶

⁶ The settlement was funded in February of 2017, but the first award amount was not determined until May of 2017 and the first payment was made in June of 2017.

Table 3
Estimated vs. Actual Costs:
Experience Through the First Eight Months

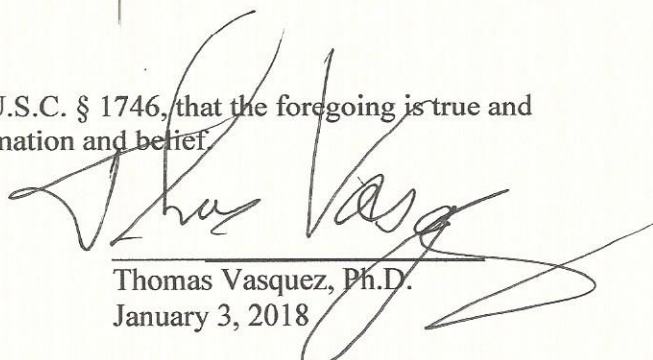
Fund/Expense	May Through December 19, 2017 ^a		
	NFL Actuary Estimates ^b	Actual	Percent Increase
MAF	160,700,000	254,000,000	58%
MAF Admin. Costs	2,000,000	3,600,000	80%
BAP ^c	11,200,000	15,800,000	41%
Total	173,900,000	273,400,000	57%

a.) The settlement was funded in February of 2017, but the first award amount was not determined until May of 2017 and the first payment was made in June of 2017.

b.) Eight months of the NFL Actuary's estimated first full year value for MAF and BAP.
 Start up costs plus seven months of processing for MAF Admin costs

c.) BAP includes exam costs, supplemental benefits, and admin costs.

I declare under penalty of perjury, pursuant to 28 U.S.C. § 1746, that the foregoing is true and correct, based upon my personal knowledge, information and belief.


 Thomas Vasquez, Ph.D.
 January 3, 2018



Special Masters Prichett and Verrier

March 6, 2018

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Exhibit B

The Segal Group Report
(See attached)

**MATERIAL PROVIDED BY COUNSEL
TO THE NFL,
PAUL, WEISS, RIFKIND, WHARTON
& GARRISON LLP**

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**REPORT OF THE SEGAL GROUP
TO SPECIAL MASTER PERRY GOLKIN**

In re: National Football League Players' Concussion Injury Litigation, MDL 2323

In re: NFL Players' Concussion Injury Litigation, MDL 2323
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REPORT OF THE SEGAL GROUP TO
SPECIAL MASTER PERRY GOLKIN

In re: National Football League Players' Concussion Injury Litigation,
MDL 2323

I. INTRODUCTION AND QUALIFICATIONS

A. Assignment

1. The National Football League and NFL Properties LLC (the “NFL Parties”) have retained The Segal Group (“Segal”) to provide an expert opinion and documentation to the Special Master, Perry Golkin, regarding the monetary sufficiency of the \$760 million proposed class action settlement between the NFL Parties, the plaintiffs, and the proposed plaintiff class (the “Settlement”), in accordance with this Court’s January 14, 2014 Order denying, without prejudice, plaintiffs’ Motion for Preliminary Approval and Class Certification (the “Preliminary Approval Order”).

2. The Preliminary Approval Order directed the parties “to share the documentation referred to in their submissions with the Court through the Special Master.” (Preliminary Approval Order at 12.) We were retained to provide such documentation and related analyses, which assess the monetary sufficiency of two specific aspects of the proposed Settlement: the Monetary Award Fund (“MAF”) and the Baseline Assessment Program (“BAP”), each of which is described in the January 6, 2014 Settlement Agreement (the “Settlement Agreement”).¹

3. In Section II of this Report, we summarize our conclusions. In Section III, we describe the development of our actuarial model and the methodology we

¹ The Segal Group also served as consultants to counsel to the NFL Parties during the course of negotiations of the Settlement Agreement. The model used for the analysis described in this Report was developed in connection with that prior consulting work.

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used in evaluating the monetary sufficiency of the Settlement. In Section IV, we set forth our results, including: prevalence projections, evaluation of the net present value ("NPV") of the fund necessary to compensate all eligible players and derivative claimants under the Settlement, analysis of the sufficiency of the BAP, and a cash flow analysis. In Section V, we set forth our final conclusions regarding the monetary sufficiency of the proposed Settlement.

B. Qualifications and Roles

4. Established in 1939, Segal is a leading employee benefits, actuarial, and human resources consulting firm with approximately 1,100 employees in 23 offices throughout the U.S. and Canada. For 75 years, Segal has been involved in developing health and retirement programs that meet the needs of employees, plan members, and plan sponsors. Segal's work includes assessing and managing pension funding risk, valuing retirement and retiree health benefits promised to participants, providing consulting services to employers and other plan sponsors regarding management of the health status of plan participants, and providing consulting services to employers and other plan sponsors regarding selection of investment managers for retirement funds. Segal regularly assists large employers² in assessing the risks associated with their health and welfare benefit plans, projects future costs of these plans, and uses actuarial modeling to properly set budgets for these benefits.

5. Howard Fluhr, the lead author of this Report, is currently the Chairman of Segal, a position he has held since 2006, after serving twelve years as

² Segal has been engaged by the NFL in several of these capacities in the past, including assessments of player disability plans and the NFL coaches' health plan, design and support of the League's officiating performance program, as well as stochastic asset liability modeling for the NFL's pension plan.

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President and Chief Executive Officer. He has been a member of Segal's Board of Directors since 1987.

6. Mr. Fluhr is a *cum laude* graduate of New York University, where he earned a bachelor's degree in Mathematics and Philosophy. He is a Fellow of the Society of Actuaries, a Fellow of the Conference of Consulting Actuaries, a Fellow of the Canadian Institute of Actuaries, a Member of the American Academy of Actuaries and the International Actuarial Association, as well as an Enrolled Actuary.

7. Mr. Fluhr has been practicing actuarial science for 50 years. Over that time, he has overseen scores of actuarial analyses and studies related to both health and retirement benefits.

8. Mr. Fluhr has further served as a consultant to both public and privately held organizations on retirement and health benefits topics, as well as on total compensation and human resource strategies. His current and past roles include:

- Member of the Board of Directors of the American Academy of Actuaries for six years and service as vice president of its pension council;
- Member of the Board of Directors for six years and served as a vice president of the Conference of Consulting Actuaries;
- Member of the Board of Trustees of the Employee Benefit Research Institute (EBRI) and previous Chairman of the Board;
- Trustee of the Committee for Economic Development (CED);
- Senior Fellow at the Jefferson School of Health Population;
- Member of The Economic Club of New York;
- Member of the National Academy of Social Insurance; and
- Member of the Dean's Advisory Council of the College of Arts and Sciences of New York University.

9. Mr. Fluhr has spoken before numerous professional and industry groups, including the Society of Actuaries, the American Academy of Actuaries, the

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Enrolled Actuaries Meeting, the International Foundation of Employee Benefit Plans, and The National Academy of Social Insurance. He has testified before a Presidential Commission on public policy issues related to retirement. He has been a guest instructor for graduate level courses at the Columbia Business School and the Harvard Business School, and he is the author of numerous articles on human resource and employee benefits issues.

10. Christopher Calvert, another member of the Segal team for this project, is a Senior Vice President at Segal with over 25 years of experience working in the healthcare industry. Mr. Calvert leads Segal's Corporate Health Practice and is responsible for delivery of health benefits services to dozens of clients. In this role, he oversees underwriting processes to assist his clients in assessing healthcare risk and cost. He received his Bachelor of Science in Consumer Economics from Cornell University and an MBA in Healthcare Administration from Baruch College/Mount Sinai Medical Center. Here, Mr. Calvert served as the project leader.

11. Howard Atkinson, a third member of the Segal team, has served as a Consultant and Health Actuary for Segal since 2005 and has worked in the healthcare actuarial field for over 35 years. He is an expert in the field of healthcare analysis, and his experience includes running cost projections, pricing plan provisions, risk analyses, reserve calculations and pricing and negotiating provider reimbursement levels. He is an Associate of the Society of Actuaries, a Member of the American Academy of Actuaries and a Fellow of the Conference of Consulting Actuaries. Mr. Atkinson was one of seven actuaries selected nationwide to serve as a Consultant to President Clinton's Health Care Reform Task Force to review the cost of the proposed Standard Benefits Plan. He

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received a Bachelor of Arts in Mathematics from Lincoln University. Mr. Atkinson served as the lead health actuary on this project.

12. Menachem Braun, a fourth member of the Segal team, has served as a Health and Retirement Actuary for Segal since 2008. His expertise includes retiree healthcare and pensions, including long-term projections, cash flow analyses, and assessment of the funding adequacy of retirement benefit plans and programs. He is an Associate of the Society of Actuaries, a Member of the American Academy of Actuaries and an Enrolled Actuary. He received a Bachelor of Arts in Mathematics from Yeshiva University, graduating *cum laude*. Mr. Braun served as the lead life actuary on this project.

13. Thomas D. Levy is a Senior Vice President and has been Segal's Chief Actuary since 1987. He has over 40 years of actuarial consulting experience. Mr. Levy coordinates all professional actuarial activities within the company, including the delivery of actuarial client services. He has overall responsibility for Segal's Actuarial Practice and chairs its Actuarial Managers' Committee. Mr. Levy has served as an expert in many litigations, including the *Agent Orange* litigation, in which he oversaw the design of, and helped calculate benefit-level determinations for, cash payments to eligible veterans and their survivors. Mr. Levy received a BA and a Master of Actuarial Science degree from the University of Michigan. He is a Fellow of the Society of Actuaries, a Member of the American Academy of Actuaries, a Fellow of the Conference of Consulting Actuaries, an Enrolled Actuary, a Fellow of the Canadian Institute of Actuaries, and an Associate of the (British) Institute of Actuaries. Mr. Levy peer-reviewed this Report.

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II. SUMMARY OF CONCLUSIONS

14. On January 6, 2014, the NFL Parties and the Class and Subclass Representatives on behalf of a proposed Settlement Class (together, the “Parties”), entered into a proposed Settlement Agreement under which the NFL Parties agreed to pay \$760 million (the “Settlement Amount”)³ into three funds over the course of a twenty-year period to settle, among other things, the claims made in *In re: National Football League Players' Concussion Injury Litigation*, MDL 2323 (“MDL 2323”). The Settlement Agreement provides that the NFL Parties will pay \$675 million into the MAF, which is designed to make cash payments to eligible retired NFL players who develop conditions consistent with serious cognitive impairment. Those conditions include dementia (both mild and moderate), Alzheimer’s disease, Parkinson’s disease, amyotrophic lateral sclerosis (“ALS”), and, in some instances, chronic traumatic encephalopathy (“CTE”) (collectively, the “Qualifying Diagnoses”). The MAF is designed to last 65 years. In the event the Settlement Amount is insufficient to pay all approved claims from the MAF, the NFL Parties have agreed to make an additional contribution of up to a maximum of \$37.5 million, subject to court approval. The Settlement Agreement further contemplates that the NFL Parties will pay an additional \$75 million into a Baseline Assessment Program (“BAP”) that serves two purposes: (a) to provide baseline medical examinations to eligible retired NFL players; and (b) for those players diagnosed with Level 1 cognitive impairment, *i.e.*, moderate cognitive impairment, to provide further testing and treatment. The BAP is designed to last ten years for testing and an additional five years to provide treatment. At the expiration of

³ Unless otherwise stated, the capitalized terms used in this Report have the same meanings as those used in the Settlement Agreement.

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the BAP term, any remaining funds out of the \$75 million will roll over into the MAF. Finally, the Settlement Agreement creates an Education Fund designed to provide safety-related education to football players, including youth football players. The NFL Parties will pay \$10 million into the Education Fund. We note that the Education Fund does not affect the amount available for the MAF or the BAP and therefore did not factor into our analysis of the sufficiency of the overall proposed Settlement.

15. In order to evaluate the sufficiency of the proposed Settlement, we developed an actuarial model designed to project the prevalence of the Qualifying Diagnoses over the proposed 65-year term of the Settlement within the entire proposed class of retired NFL players who develop Qualifying Diagnoses at any point during the term of the Settlement and the associated monetary awards to those players and their derivative claimants.⁴ We of course cannot project with absolute certainty how many players, which players, and when such players will develop Qualifying Diagnoses at specific ages over the next 65 years. The science of making such projections is the core focus of actuarial science. We built a model in which we utilized conservative assumptions within a reasonable range based on the best possible data.⁵ In developing our assumptions, we at each stage sought to err on the side of overstating the number of players who will develop Qualifying Diagnoses and also sought to err on the side of projecting the development of the Qualifying Diagnoses at earlier ages. We did so in

⁴ We did not account separately for payments to Derivative Claimants because the Settlement Agreement provides that those payments are already included within the calculation of the monetary awards to qualifying retired players.

⁵ At all times, we followed actuarial standards of practice in developing our assumptions. See, e.g., M. Oliver, *Assessment and Selection of Actuarial Assumptions for Measuring Pension Obligations* (2009), available at <http://www.soa.org/files/pdf/edu-2009-fall-ea-assess-sn.pdf>.

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order to better test the sufficiency of the fund. This conservative approach increases the confidence in our conclusions regarding the sufficiency of the fund.

16. Our model was built in the following steps. First, we created a database of the approximately 20,500 players in the proposed class of retired NFL players and collected all available relevant information regarding those players, such as number of seasons played and current ages of those players. We obtained credited seasons and age information from the NFL. Second, we received a sample data set from Co-Lead Counsel for the Plaintiffs identifying the current cognitive impairment, or lack thereof, for approximately 1,500 plaintiffs in MDL 2323. We used that cognitive impairment information to determine the number of Qualifying Diagnoses, or the “prevalence rate,” within the population of 1,500 plaintiffs. We then used those prevalence rates within the population of 1,500 plaintiffs to project the current prevalence of Qualifying Diagnoses within the approximately 19,000 remaining players in the proposed class, from which we derived an initial prevalence rate across those 19,000 retired players. Finally, we modeled the progression over time of the Qualifying Diagnoses within the entire population of 20,500 players to project the total prevalence rates over the entire class population for the 65-year term of the Settlement.

17. The Settlement Agreement provides that monetary awards paid in future years will be subject to an annual inflation adjustment of up to 2.50%, the precise amount each year to be determined by the Court or the Special Master. The Settlement Agreement also provides that the NFL Parties will fund the Settlement over a twenty-year period based on a payment schedule set forth in the Settlement Agreement. Because of these two aspects of the Settlement, it was necessary to: (a) adjust upward the size of the

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awards in nominal dollars going forward based on projected inflation, and (b) calculate the expected present value of future contributions and awards in order to reflect the time value of money to evaluate the adequacy of the settlement funding at the present time. Our assumptions regarding the appropriate discount (4.50%) and inflation (2.0%) rates that we used are described in this Report.

18. In order to develop our projections, we made a series of informed, reasonable, and conservative assumptions about various factors provided for in the proposed Settlement, which are described below. In designing our model, we attempted to build in a margin of error such that there is a greater likelihood that we are overestimating, rather than underestimating, both the prevalence of Qualifying Diagnoses that will occur within the population of retired NFL players who participate in the Settlement and the monetary awards associated with those prevalence projections. In other words, our goal was to project more monetary payments at higher values to retired players than we would otherwise expect to occur over the term of the Settlement. For these reasons, we consider our approach to be a conservative one that may well overestimate both the number of players that actually will suffer from the Qualifying Diagnoses defined in the Settlement Agreement and the ages at which such players will be affected by such conditions. The overall methodology used to develop this model was based on well-established and accepted methods and approaches in the field of actuarial science that are commonly employed in forecasting and modeling health and benefit plans.

19. **Based on the model utilized by our team and the conservative assumptions detailed in this Report, we are confident that the \$760 million proposed**

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Settlement is sufficient to fund the expected monetary awards and BAP benefits to eligible and qualified participating class members over the life of the program and to pay the required administrative costs.

20. Specifically:

(a) The \$75 million BAP Fund is sufficiently funded. Indeed, based on the assumptions detailed within this Report and the funding requirements during the term of the BAP, we expect that there will be an \$11 million surplus on a net present value basis available that will rollover into the MAF at the conclusion of the BAP. Details of our calculations are provided further in this Report.

(b) The Settlement Agreement includes a Monetary Award Grid (the “Grid”) that sets forth the maximum monetary award for eligible and qualified class members based on their Qualified Diagnosis and age. We project that monetary awards with an actual dollar payout of approximately \$900 million will be paid out to eligible retired NFL players over the life of the Settlement. This \$900 million in awards has a net present value of approximately \$537 million.

(c) The NPV of the \$675 million fund to be paid into the MAF over twenty years—after removing \$10 million for administration of the awards—is \$533 million. After accounting for the \$11 million rollover from the BAP, we project a \$7 million cushion for the monetary awards that we forecast will be paid over the life of the MAF, *without touching the \$37.5 million contingency fund.*

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(d) As noted, based on our projections, we do not anticipate that any portion of the \$37.5 million contingency fund will be triggered under Section 23.4 of the Settlement Agreement. (Section 23.4 provides that the NFL Parties will contribute an additional contingent contribution of up to a maximum amount of \$37.5 million in the event the \$675 million dedicated to the MAF becomes insufficient at any time during the term of the Settlement).

(e) Based on our conservative assumptions, and given the existence of the \$37.5 million contingency fund, we are confident that the overall funding of the MAF is sufficient to cover the anticipated payouts to class members.

III. DEVELOPMENT OF MODEL AND METHODOLOGY

A. Overall Design of Model & Assumptions

21. Actuaries are tasked with forecasting unknown events over extended periods of time. Here, we have been asked to forecast the prevalence of various Qualifying Diagnoses for a group of retired NFL players over the next 65 years. In doing so, we relied upon the best available data and made reasonable, informed and conservative decisions about the necessary assumptions required to create our actuarial model.

22. Our model is designed to project the prevalence of each Qualifying Diagnosis across the class of retired NFL players throughout the 65-year term of the Settlement. The model runs those prevalence projections against the Grid agreed to by the Parties as part of the Settlement Agreement. The Grid sets forth the baseline awards for each Qualifying Diagnosis based on the retired NFL football player's age at diagnosis. Applying the Qualifying Diagnosis prevalence projections against the Grid

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determines the nominal value of the likely awards over the life of the Settlement based on a series of assumptions about the rates of prevalence of the Qualifying Diagnoses and the ages at which players are likely to develop those Qualifying Diagnoses and when payouts will be made. The model further incorporates the Offsets agreed to by the Parties and addressed in the Settlement Agreement that result in reductions to the baseline monetary awards outlined in the Grid. These Offsets are applied for the following factors: fewer than five Eligible Seasons played, a prior stroke, a prior traumatic brain injury, and non-participation in the BAP. These Offsets are applied in a multiplicative manner pursuant to the terms of the Settlement Agreement. In other words, if two Offsets of 25% apply, rather than adding them and applying a 50% Offset to the award, we multiply the 25% Offsets and apply a 43.75% Offset to the award. After all expected awards are projected over time, we calculated the value in today's dollars of all of the future payouts using an appropriate discount rate.

23. We made a series of assumptions that work together to generate the prevalence and NPV calculations. As discussed in more detail below, we made assumptions regarding: (a) sample data prevalence rates, (b) age at diagnosis, (c) progression of diagnoses, (d) participation rates in the Settlement, (e) inflation/discount rates, and (f) the frequency of the Offsets agreed to in the Settlement Agreement. We formulated these assumptions by relying on a variety of sources, including, but not limited to, a review of epidemiological studies regarding the incidence and prevalence of the Qualifying Diagnoses within the general population and the population of retired NFL players as well as discussions with a neurologist and epidemiologist, Dr. Kristine Yaffe.⁶

⁶ Dr. Kristine Yaffe is a medical consultant retained on behalf of the NFL Parties. She is a Professor in the Departments of Psychiatry, Neurology and Epidemiology at the University of California San

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The list of epidemiological studies we reviewed and relied upon is attached in Appendix A to this Report. As noted above, consistent with our overall approach, we focused on developing assumptions that are conservative, both individually and in aggregate. The results of our assumptions, when combined with the known parameters within the model, indicate that 33% of plaintiffs and 28% of the overall player population are expected to develop a Qualifying Diagnosis in their lifetime. Thus, our assumptions result in prevalence rates by age group that are materially higher than those expected in the general population. Furthermore, the model forecasts that players will develop these diagnoses at notably younger ages than the general population.

24. The chart below compares our projected prevalence rates of dementia and Alzheimer's in the overall population of retired players that we anticipate will participate to prevalence rates in the general population. These results support the statement above that our model assumes that more players will have a Qualifying Diagnosis than seen in the general population, and that these diagnoses will occur at significantly younger ages. It is important to note that the chart shows age at onset of final Qualifying Diagnoses of Alzheimer's or Level 2 dementia for each participating player, and thus does not account for the fact that our model also assumes that the players will develop Level 1.5 dementia at even earlier ages than represented in this chart. As the chart below demonstrates, at all age bands, the prevalence rates of Alzheimer's and dementia in the participating player population generated by our model after all of our assumptions are applied—which account for approximately 90% of projected Qualifying

Francisco ("UCSF"). Dr. Yaffe is trained in neurology and psychiatry and has a clinical practice in those areas at UCSF. She is also the Director of the UCSF Dementia Epidemiology Research Group, which conducts research relating to cognitive function and dementia in aging populations throughout the United States, and the Chief of Geriatric Psychiatry and Director of the Memory Disorders Clinic at the San Francisco VA Medical Center.

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Diagnoses—are consistently significantly higher than the corresponding prevalence rates in the general population.

Age Group	Segal Model Results - Prevalence of Alzheimer's and Dementia in Participating Player Population ⁷	Epidemiology on General Population ⁸
less than 50	0.8%	<0.1% ⁹
50-54	1.4%	<0.1%
55-59	2.3%	<0.1%
60-64	3.5%	<0.1% - 1.3%
65-69	5.2%	<0.1% - 2.1%
70-74	7.8%	2.8% - 3.7%
75-79	12.1%	4.9% - 6.8%
80-84	22.2%	12.3% - 13.0%
85-89	58.2%	20.3% - 21.6%
90+	n/a	38.5% - 45.2%

B. Database of Retired NFL Football Players

25. Our team first developed a database of identifiable retired NFL football players using information we obtained from the NFL and other public sources. We believe this database represents virtually all of the proposed class of retired NFL players.¹⁰ This database is being provided to the Special Master.

⁷ These results are based on the assumptions described in this Report.

⁸ Findings are based on studies by Hurd, *et al.* (2013), Pierce, *et al.* (2013), and Plassman, *et al.* (2007).

⁹ We were unable to identify prevalence rates for Alzheimer's and dementia in the general population for ages below 60. We have used "<0.1%" to note that the prevalence rates for these conditions are very low based on the lack of epidemiology in this area. We note that the rates between ages 60 and 70 range between <0.1 and 2.1%, and are lower below age 60.

¹⁰ We note that players who participated in training camps of NFL teams but did not make any roster are included in the proposed class. We do not have sufficient information to individually identify the members of this group, but as explained below in footnote 21, we have determined that this unknown group of players will not have a material impact on our analyses or conclusions.

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26. The database includes information about approximately 20,500 retired NFL football players in the following two groups: (a) 18,919 living retired players of whom 4,808 are plaintiffs; and (b) 1,642 deceased retired players of whom 77 are plaintiffs. Within these groups, certain relevant parameters were known about the players while others were not, as reflected in the following chart:

Known Parameters	Unknown Parameters
Date of birth	Level of cognitive impairment (certain class members)
Date of death	Age at diagnosis (certain class members)
Credited seasons	Participation in Settlement and exams
Seasons played in NFL ¹¹	Traumatic brain injury from non-NFL incident
Plaintiff/non-plaintiff and date of lawsuit	Stroke
Level of cognitive impairment (certain class members)	
Age at first diagnosis (certain class members)	

C. Plaintiffs' Sample Data File

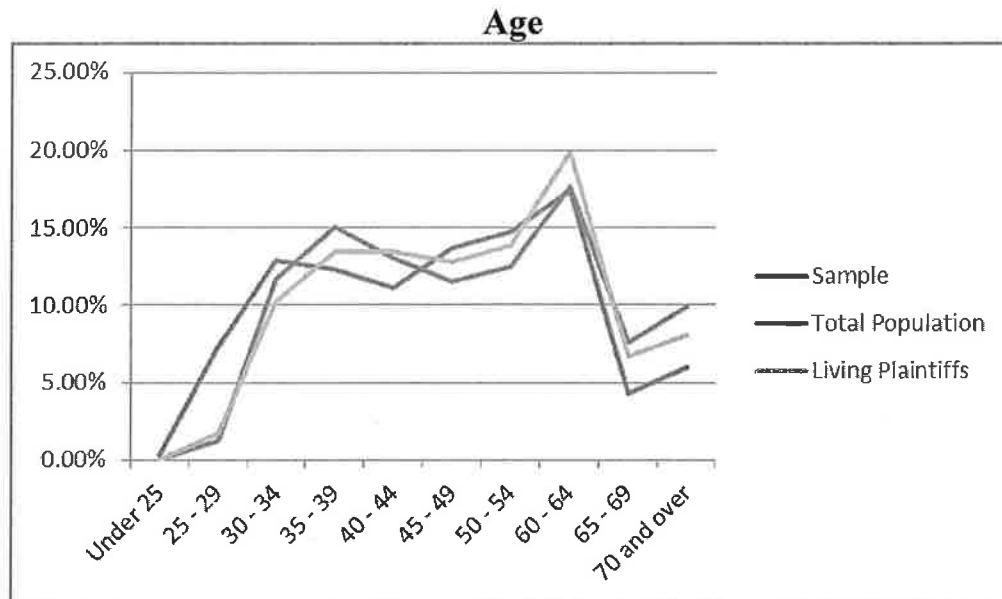
27. In addition, the plaintiffs in MDL 2323 provided us with a data file containing certain demographic information for 2,179 former players, of whom 1,584 former players provided information regarding their level of cognitive impairment/diagnosis of conditions. This database also is being provided to the Special Master.

¹¹ The NFL provided us with information regarding the number of Credited Seasons for the approximately 20,500 players in our database. Although the definition of Eligible Seasons in the Settlement Agreement is not identical to the definition of Credited Seasons used in various NFL plans, including its pension plan, the Credited Seasons data served as a reliable proxy for Eligible Seasons and allowed us to project accurately the Eligible Seasons Offsets agreed to in the Settlement Agreement. A chart reflecting the number of players at each level of Credited Seasons is included below in paragraph 41(a) of this Report. Moreover, the Credited Seasons data for each individual player is included in our database of approximately 20,500 players which has been provided in electronic format to the Special Master.

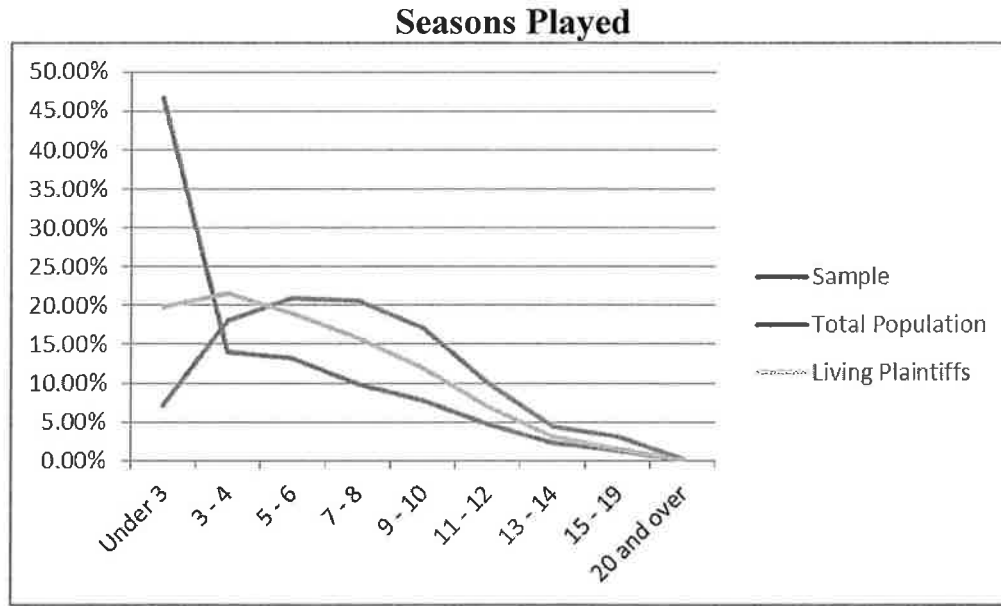
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28. Upon receiving plaintiffs' sample player data file, we first assessed whether the sample group was representative of the more than 20,500 retired NFL players in our database by comparing the ages and number of seasons played of players in the two groups. We determined that plaintiffs' sample group was representative of the larger group with respect to age; however, with respect to seasons played, the sample group contained proportionally more veteran players, *i.e.*, more players who played more seasons in the NFL than the overall proposed class of retired NFL players. This distinction between the sample group and the larger database was taken into account in determining how appropriately to extrapolate the prevalence rates of the sample group to the remaining approximately 19,000 players in our database of retired NFL players, as discussed in more detail below.

29. Graphs demonstrating the results of our analysis of the representative nature of the sample group are provided below.



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30. Because the sample data file was statistically representative of the overall class of retired NFL players in terms of age and seasons played (after adjusting for the higher proportion of veterans in the sample), we used that data as the starting point for our assumptions (discussed below) and prevalence projections of Qualifying Diagnoses and to determine the amount of money necessary to fund the Settlement. However, after reviewing the prevalence rates (and ages of diagnosis) from the sample data, we believe that the plaintiffs who make up the sample data file, as a result of having chosen to initiate a lawsuit against the NFL Parties and having provided data regarding their cognitive impairment, are more likely to have a current Qualifying Diagnosis than other retired players who have not initiated lawsuits or have not provided such cognitive impairment information. We hold this view because it is likely that players who are currently suffering from cognitive impairment, particularly at the level of dementia or above, were more likely to file a lawsuit against the NFL Parties than players who are currently asymptomatic. Similarly, it is likely that players who currently suffer from cognitive impairment at the level of dementia or above were more likely than

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asymptomatic players to report those conditions to their counsel through the sample data collection process. Thus, we adjusted for the greater likelihood that players in plaintiffs' sample data set suffered from cognitive impairment as compared to those outside that data set. We believe this adjustment was necessary to ensure the accuracy of our model. We describe this adjustment below (*see* ¶ 41(a)) in our discussion of Sample Data Rates.

D. Analyzing Plaintiffs' Data Set

31. Once we obtained the sample data set from the plaintiffs, we sought to determine the current level of cognitive impairment within that population of approximately 1,500 players for whom we had such data. As described below, once we determined the current prevalence rates of the Qualifying Diagnoses within the sample group of 1,500 players, we used those prevalence rates to project the prevalence rates of the Qualifying Diagnoses within the remaining 19,000 players.

32. The diagnostic information reported by plaintiffs in the sample data file was not identical to the Qualifying Diagnoses in the Settlement Agreement. Rather, it is our understanding that the former players completed an online survey identifying their diagnoses, conditions or symptoms and specifying whether such diagnoses, conditions or symptoms were self-reported or diagnosed by a physician. A screenshot of the diagnoses/symptoms provided to us by plaintiffs is being provided to the Special Master. Because the diagnoses/symptoms were not identical to the definitions for the Qualifying Diagnoses, we were required to make a series of assumptions about the sample group depending on how many symptoms they suffered from and whether those symptoms were diagnosed or self-reported. Those assumptions were as follows:

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**Classification of Plaintiffs' Data Sample
Based on Plaintiff Award Definitions**

Most Severe Condition Reported	Count	None/ Level 1	Level 1.5	Level 2 ¹²	ALS	CTE
ALS	9				9	
Parkinson's	5			5		
Dementia	58			58		
Alzheimer's	29			29		
9 or more diagnosed deficits	42	21	21			
8 diagnosed deficits	21	10.5	10.5			
7 diagnosed deficits	41	41				
6 diagnosed deficits	32	32				
5 diagnosed deficits	45	45				
4 diagnosed deficits	67	67				
3 diagnosed deficits	58	58				
9 or more self-reported deficits	130	130				
8 self-reported deficits	77	77				
7 self-reported deficits	90	90				
6 self-reported deficits	94	94				
5 self-reported deficits	128	128				
4 self-reported deficits	159	159				
3 self-reported deficits	182	182				
Neuro-Cognitive diagnosed	69	34.5	34.5			
Neuro-Cognitive self-reported	248	248				
CTE	8					8
Total	1592	1417	66	92	9	8

33. As shown in the chart, for players who reported diagnoses of dementia, Alzheimer's, Parkinson's, ALS, or CTE, we assumed that they, in fact, currently have dementia (Level 2), Alzheimer's, Parkinson's, ALS, or CTE. In other words, we fully credited reports of diagnoses of the Qualifying Conditions.

34. We also had to determine how to treat players who reported "symptoms" included in plaintiffs' database, with or without any formal diagnosis. In general, if a player reported a large number of diagnosed symptoms (8 or more), we

¹² Includes Level 2, Parkinson's and Alzheimer's as appropriate.

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assumed, for purposes of the model, that 50% of those players were in Level 1.5, *i.e.*, mild dementia—again, a reasonable and conservative assumption in our view given that those players did not identify themselves as diagnosed with dementia. The remaining 50% of those players were assumed not to have a Qualifying Diagnosis. This approach was reasonable and conservative as well in our view because: (a) many of the symptoms, such as headaches or sleeplessness, are common in the general population and do not, in fact, necessarily indicate mild dementia; (b) even symptoms that were reported to be “diagnosed” were in fact self-reported, *i.e.*, players were not required to provide medical records supporting any diagnosis, which gives us less confidence in their accuracy; and (c) some of the symptoms, such as memory loss and forgetfulness, were redundant, thereby increasing the likelihood that a player would report more symptoms. If a player reported that he had been diagnosed with fewer than eight symptoms or did not claim that his symptoms were diagnosed, we considered him asymptomatic. We did so because the lowest Qualifying Diagnosis is Level 1.5, or mild dementia; and we believe it is reasonable to assume that a player that took the time to bring a claim against the NFL Parties had every incentive to list all symptoms associated with mild dementia or to have reported a diagnosis of that condition if his condition could at all be construed as such.

35. Plaintiffs’ database also included a condition labeled as “Neuro-Cognitive diagnosed” or “Neuro-Cognitive self-reported.” This condition was not defined. For those players who said that they were “Neuro-Cognitive diagnosed,” we assumed that 50% of those players were in Level 1.5, *i.e.*, mild dementia—again, a reasonable and conservative assumption in our view, given that those players who identified themselves as “Neuro-cognitive diagnosed” did not identify themselves as

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diagnosed with dementia. The remaining 50% of those players were assumed to not have any Qualifying Diagnosis. For the same reasons that we did not apply a Qualifying Diagnosis to players who only self-reported symptoms (*see* ¶ 31, above), we assumed players who stated that they were “Neuro-cognitive self-reported” were asymptomatic.

E. Generating Prevalence Rates

36. Using the assumptions described above, we generated the prevalence rates for the sample group of approximately 1,500 players. Those prevalence rates were as follows: 4.1% of the sample group currently have a Qualifying Diagnosis of Level 1.5; 5.8% currently have a Qualifying Diagnosis of Level 2, Alzheimer’s Disease or Parkinson’s disease;¹³ 0.6% currently have a Qualifying Diagnosis of ALS; 0.5% currently qualify for death with CTE under the Settlement Agreement; and 89.0% of the plaintiffs in the sample data file do not have a current Qualifying Diagnosis.

37. We validated these prevalence rates of the Qualifying Diagnoses among the sample group against epidemiological studies focused on the general population and on retired NFL players. (*See* Appendix A.) We determined that the prevalence rates among the sample group were higher than the prevalence rates found in general population studies and even studies focused on professional football players. As discussed below, we used these higher prevalence rates in developing projections

¹³ Our review of medical literature and information provided by medical consultants informed us that epidemiologists and clinicians do not always distinguish between dementia and Alzheimer’s disease. In certain epidemiological studies, dementia is considered an umbrella condition that incorporates all forms of dementia, including Alzheimer’s. Our review of medical literature also informed us that the prevalence rates for Parkinson’s Disease in the general population are relatively low as compared to the rates of dementia and Alzheimer’s. Thus, when making our projections about which players statistically were likely to develop Level 2 dementia versus Alzheimer’s versus Parkinson’s, we used the following ratios for those conditions. We assumed 55% of players whose condition progressed to Level 2 independent of their starting point would become diagnosed with Alzheimer’s, 5% with Parkinson’s, and 40% with Level 2 dementia.

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regarding the prevalence of Qualifying Diagnoses within the 19,000 players for whom diagnoses are unknown.

38. As discussed above, the prevalence rates for the sample group became the basis for our projections of prevalence rates within the remaining approximately 19,000 players in our database. Before extrapolating the sample group data across our database of retired NFL players, however, we “hard-coded,” or locked in, the Qualifying Diagnoses for the sample group players who we believe today have a Qualifying Diagnosis of Level 2, Alzheimer’s Disease, Parkinson’s Disease, ALS, or CTE.¹⁴ Thus, when our model is run against the entire population of retired NFL players, it will always project that those players have the Qualifying Diagnoses they reported.¹⁵ For certain players in the sample data file, in addition to their symptoms or diagnoses, plaintiffs provided us with the date of diagnosis as well. In those instances, we also “hard-coded” the date of diagnosis so that we would know exactly where they fall on the Grid, which adjusts awards for age of diagnosis. For those players for whom the date of diagnosis was not provided, consistent with our conservative approach, we assumed the age of diagnosis was their age at January 1, 2013 and “hard-coded” their ages of diagnoses accordingly.

39. After developing initial prevalence rates for the 20,500 players in our database, we projected how prevalence rates would progress over the 65-year term of

¹⁴ We also obtained information we viewed as reliable regarding the conditions of certain non-plaintiffs from public sources. In particular, we identified players who reportedly have been diagnosed with ALS and/or CTE. In those instances, we also “hard-coded” their diagnoses in our database.

¹⁵ We hard-coded players in the sample group who reported that they were diagnosed with dementia in Level 2. However, specific players from the sample group who were assigned to Level 1.5 were not hard-coded with that diagnosis because they had not reported a diagnosis of dementia, but rather were assigned to mild dementia based on our assumptions about the sample data group. Thus, those players were randomly assigned to Level 1.5 or asymptomatic with a 50% probability.

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the Settlement as class members aged. After determining initial prevalence rates, we assumed that a certain number of asymptomatic players—whether plaintiffs or non-plaintiffs—would progress and develop dementia, Alzheimer's or Parkinson's disease over their lives and the Settlement term.

F. Assumptions

40. The model divided the class into four groups:

(a) Plaintiffs for whom specific diagnosis information is known based on the sample data (1,565 former players);

(b) Plaintiffs for whom specific diagnosis information is unknown (3,320 former players);

(c) Non-Plaintiffs for whom specific diagnosis information is known based on public research (80 former players); and

(d) Non-Plaintiffs for whom specific diagnosis information is unknown (15,596 former players).

41. We separately made the following assumptions:

(a) **Sample Data Rates.**

(i) In order to determine the initial prevalence rates for the remaining approximately 19,000 players in our database, we took the prevalence rates for the sample data group of approximately 1,500 players and applied them after adjusting to reflect lower overall assumed prevalence rates among the remaining 19,000 players. We did this for several reasons. First, as discussed above, the sample group contained proportionally more veteran players than the database of the entire proposed class

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of players. Second, as discussed above, we assumed that players with current cognitive impairment, particularly severe impairment, were more likely to have participated in the litigation and to have reported their symptoms and conditions in the database. The prevalence rates that we observed in the sample data group, when combined with the ages at which such diagnoses were occurring, were higher than prevalence rates not only in general population epidemiology, but also in epidemiology focused on professional football players. Both of these points indicate a strong selection bias in the sample data towards players with current cognitive impairment. As such, we reduced the prevalence rates used for the remaining 19,000 players when compared to the sample data by the following factors:

(ii) For plaintiffs who are not part of the sample group, we assumed prevalence rates of 50% of those rates identified in the sample data set. For example, 4.1% of the sample group plaintiffs were projected to have a current diagnosis of Level 1.5; we therefore projected that 2.1% of the remaining plaintiffs have a current diagnosis of Level 1.5. For non-plaintiffs, we assumed prevalence rates of 25% of those rates identified in the sample data for living non-plaintiffs and 12.5% of those rates for deceased non-plaintiffs. We applied the lowest prevalence rates to deceased non-plaintiffs because their conditions are static and we believe that the

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families of deceased players with Qualifying Diagnoses were more likely to initiate lawsuits than the families of deceased players without Qualifying Diagnoses. Thus, we expect fewer players with Qualifying Diagnoses in the deceased, non-plaintiff group as compared to living non-plaintiffs.

(iii) Described another way, it is likely that plaintiffs are more likely than non-plaintiffs to have Qualifying Diagnoses at the present time, and that plaintiffs who have the ability to establish their diagnosis have done so. Therefore, plaintiffs for whom we do not have a current diagnosis are given half the prevalence rates of those who have, and non-plaintiffs are given half the rate of undiagnosed plaintiffs. As discussed in detail below (*see* ¶ 34 below), our assumptions, including these sample data rate assumptions, were validated against the final results of the model, which gives us further confidence that the sample data rate assumptions are reasonable.

(iv) We believe these overall current prevalence results are consistent with the various epidemiological studies that we reviewed. We also discussed the reasonableness of these assumptions with Dr. Yaffe, who concurred that they were reasonable. A summary chart of the prevalence rates is below.

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Summary of Initial Prevalence Rates

	Sample Data	Remaining Population (no diagnosis information available)			
Cognitive Impairment	Observed Prevalence in Sample Group	Non-Deceased Plaintiff	Non-Deceased Non-Plaintiff	Deceased Plaintiffs ¹⁶	Deceased Non-Plaintiffs
None/Level 1	89.0%	94.7%	97.4%	0.0%	98.7%
Level 1.5	4.1%	2.1%	1.0%	39.5%	0.5%
Level 2 ¹⁷	5.8%	2.9%	1.5%	55.1%	0.7%
ALS	0.6%	0.3%	0.1%	5.4%	0.1%
CTE ¹⁸	0.5%	0.0%	0.0%	0.0%	0.0%

(b) **Initial age assignment.** For the same reasons that we adjusted the prevalence rates for the sample group, we also adjusted the initial age assignments of the sample group to reflect that the Qualifying Diagnoses would be diagnosed within the 19,000 players at somewhat later ages than the sample group. We did so based on epidemiological studies we reviewed that discuss prevalence of the diagnoses by age. As has been discussed, because plaintiffs—particularly those who provided diagnosis information—are more likely to have Qualifying Diagnoses, we assume a meaningful selection bias in the sample data set. This selection bias results in higher initial prevalence rates, particularly at younger ages. We, therefore, adjusted for this bias and made adjustments to the initial age results from the sample group. Our adjustments still result in a

¹⁶ There are only 32 deceased plaintiffs for whom we do not have diagnosis information. Of the 45 deceased plaintiffs for whom we have diagnosis information, 44 have a Qualifying Diagnosis based upon the information provided to us.

¹⁷ Includes Level 2, Alzheimer's and Parkinson's.

¹⁸ We have assumed that all players diagnosed with CTE (based on public information) will participate in the Settlement and claim monetary awards. Because the Settlement will not provide monetary awards for CTE for players diagnosed with CTE after the date of Preliminary Approval, the model assumes that no other players will be diagnosed with CTE.

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significantly higher prevalence in younger age groups than in the general population. As just one example, prevalence of dementia, Alzheimer's, and Parkinson's in the general population below age 50 is less than 1%. In fact, it is difficult to find a single study showing prevalence rates of those conditions below age 50 and the rates between ages 60 to 69, which are necessarily higher than the rates below age 60, range from <0.1 to 2.1%. By contrast, the prevalence rate in the sample group below age 50 is nearly 200 times that observed in the general population (based on a general population prevalence rate of 0.01%, which we believe is a reasonable estimate based on the lack of epidemiology related to the population below age 50). There is no medical literature suggesting a relative risk of anything close to that magnitude for football players or even non-football players who experience head trauma. Thus, for the 19,000 players that we project have a current Qualifying Diagnosis, we made a reasonable assumption resulting in a prevalence rate below age 50 for the overall class of retired players that is 35 times the general population rate. Thus, in making this assumption, we believe we are erring on the side of forecasting that players with current Qualifying Diagnoses will have those diagnoses at earlier ages (and thus receive higher monetary awards). This is consistent with the conservative approach we have taken in making our assumptions.

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Initial Age Distribution of Qualifying Diagnoses

Initial Age Distribution		
Ages	Observed Age in Sample Group for Qualifying Diagnoses	Assumed Distribution
49 & Younger	40%	2%
50 – 59	15%	15%
60 – 69	20%	35%
70 – 79	22%	38%
80 +	3%	10%

(c) **Progression.**

(i) In addition to determining current prevalence rates, we also made assumptions regarding progression rates over the 65-year term of the Settlement. Using the current prevalence rates of Qualifying Diagnoses across the entire class as a starting point, we projected how the conditions of players without a Qualifying Diagnosis (asymptomatic and Level 1) and players who have current diagnoses of Level 1.5 would progress over time. We believe our projection assumptions are consistent with the various epidemiological studies that we reviewed. We also discussed the reasonableness of these assumptions with Dr. Yaffe, who concurred that they were reasonable. Moreover, we validated the results of our progression assumptions by comparing the overall prevalence rates (by Qualifying Diagnosis and age) generated by the model against expectations in the general population based on

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the epidemiology we reviewed. Once again, our model results in higher prevalence rates at earlier ages than the general population.

(ii) The progression rates we used were as follows: 25% of players without a Qualifying Diagnosis (asymptomatic and Level 1) will develop a Qualifying Diagnosis other than Level 1.5, *i.e.*, Level 2, Alzheimer's, or Parkinson's; 1% of players without a Qualifying Diagnosis (asymptomatic and Level 1) will develop a Qualifying Diagnosis of Level 1.5 and progress no further;¹⁹ and 100% of participants with an initial diagnosis of Level 1.5 will progress to a Qualifying Diagnosis other than Level 1.5, *i.e.*, Level 2, Alzheimer's, or Parkinson's. Our 25% assumption is reasonable when compared to the expectation from general population epidemiology that less than 20% (approximately 17%) of the general population will develop dementia prior to death. Here, we assume 25% of the asymptomatic or Level 1 population alone will reach moderate or severe dementia prior to death, and are thus assuming that the retired players will develop these conditions at a rate of approximately 1.3 to 1.5 times the general population (depending on the study). We are further assuming that the retired players will develop the conditions at much earlier ages than the general population. We note that we also have assumed that 100%

¹⁹ We note that we have assumed that a small number of players (1%) without an initial Qualifying Diagnoses will progress to Level 1.5, but will not progress further to Level 2 because some players may die before progressing.

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of the players that we believe have a current diagnosis of Level 1.5 will progress to Level 2 within five years.

(iii) In addition, we randomly assigned ages for players that we project will develop Qualifying Diagnoses in the future between the current ages of players at the time of the Settlement Agreement and age 87. We used age 87 as the expected age of death based on current mortality tables.²⁰ We assumed that the progression would be weighted toward later ages based on our review of epidemiology, in which we see much higher prevalence rates at later ages in the general population. We used an actuarial technique to generate a distribution function to reflect the expected distribution of progression ages based on epidemiology. The table below illustrates the expected progression age for sample starting ages. We compared our final age distributions to epidemiology and determined that we were projecting the players to develop Qualifying Diagnoses at significantly earlier ages than those diagnoses occur within the general population, which further validated our approach. The general shape of the curve that we were looking to model can be found on page 84 of the article published by W. Rocca, *et al.*²¹ Our model produces a distribution curve that exhibits a similar concave, upward shape, but has higher

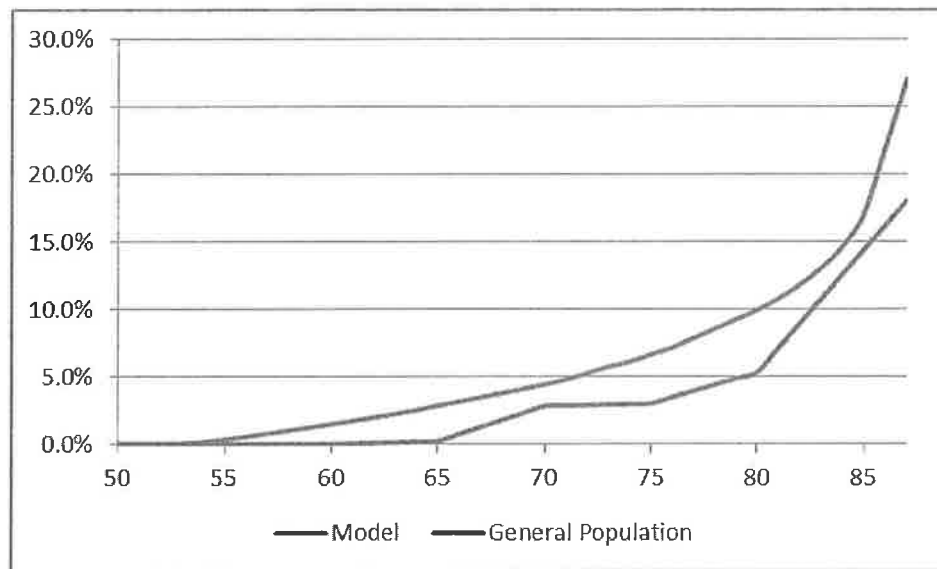
²⁰ See Appendix B for a discussion of the mortality tables used in our model and how they were applied within the model.

²¹ See Appendix A for additional details of this article.

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prevalence rates at younger ages and throughout. Our model is particularly conservative for ages prior to 65, where we are projecting rates that are 100 to 200 times higher than for the general population. These ages have larger payouts from the award grid. The graph below compares the prevalence rates produced as part of our progression modeling against prevalence rates for the general population.

**Distribution of Expected Final Progression Ages for Retired NFL
Population Compared to General Population**



(iv) With respect to progression, we have considered that there may be future advances in medicine—including improved pharmaceutical therapies or even cures for one or more of the Qualifying Diagnoses—but have not made any adjustments to our model to account for that possibility. While it is reasonable to assume that advances will be made, the timing and effect of

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these advances are unknown. As such, we chose a conservative approach that assumed no improvement in the incidence or prevalence of the Qualifying Diagnoses over time.

(v) In addition, we considered adjustments to our model for future improvements that may impact mortality, but deemed that these improvements will not have a meaningful impact on overall awards due to the large offsets in the Grid at older ages, the time value of money given that the impact of any extended projected mortality will be far into the future, and the fact that we are evaluating monetary awards that will be paid to a closed group of former players with known current ages. Furthermore, the overall prevalence rates in our model far exceed current general population epidemiology. This result, combined with the fact that the Grid significantly reduces awards above age 80 (when later mortality would impact prevalence rates) indicates that no further adjustment for future changes in prevalence at advanced ages was appropriate.

(d) **Level 1.5 to Level 2.** For each player that we project will develop Level 2 in the future, we have assumed that he will first pass through Level 1.5 five years prior to his diagnosis of Level 2. This assumption was based on information provided to us by medical consultants regarding the progression from mild to moderate or severe dementia.

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(e) **Participation Rates in the Settlement.** We have assumed that 95% of plaintiffs and 50% of non-plaintiffs will participate in the Settlement based on discussion with and guidance from counsel. These assumptions result in over 60% of the total class of retired players participating in the Settlement. We consider these assumptions to be reasonable based on the discussion below. First, with respect to plaintiffs who have sought out counsel and filed a claim against the NFL Parties, we believe the vast majority of those players will remain in the Settlement and participate in the benefits available to them. Second, with respect to non-plaintiffs, based on a review of relevant literature, participation rates in class settlements generally range from 15 to 40%.²² Because the population of retired NFL players is well known, this litigation has been highly publicized, and we anticipate that every class member will receive actual notice and the payments for Qualifying Diagnoses potentially are significant, we expect that a materially higher percentage of class members will participate in this Settlement as compared to other class settlements. However, even though we assume a significantly greater participation in the Settlement than that reported for other

²² We have been provided with material indicating that fewer than one-third of class members generally participate in a class action settlement's claims process. This is consistent with the expert opinions accepted by a court in another major class action settlement in the Eastern District of Pennsylvania. There, the court cited expert opinions stating that "maximum participation in class settlement is historically 40%", and "the median historical participation rate in class action settlements is much lower, running at about 15%." *In re: Diet Drugs Prods. Liab. Litig.*, No. MDL 1203, 2001 WL 283163 (E.D. Pa. Mar. 21, 2001). We understand that these figures are also consistent with academic research. See Christopher R. Leslie, *The Significance of Silence: Collective Action Problems and Class Action Settlements*, 59 Fla. L. Rev. 71, 119-20 (2007) ("It is not unusual for only 10 or 15% of the class members to bother filing claims."); John C. Coffee Jr., *The Regulation of Entrepreneurial Litigation: Balancing Fairness and Efficiency in the Large Class Action*, 54 U. CHI. L. REV. 877, 920 n.107 (1987) ("Out of thirty class actions surveyed . . . in which class members had to file in order to receive benefits, only eight such actions had a response rate of 30 percent or more."); John C. Coffee, Jr., *Litigation Governance: Taking Accountability Seriously*, 110 Colum. L. Rev. 288, 334 (March 2010) (fewer "than thirty percent of the institutional investors in the securities class actions . . . filed claims after a settlement had been reached[.]").

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class settlements, we assume a 50% participation rate for non-plaintiffs because, among other reasons: (a) despite the widespread publicity surrounding this litigation, approximately only 25% of the class has decided to participate in the litigation by initiating a lawsuit; (b) some players may simply choose not to participate in the Settlement, either at the point of registration or when they become eligible for monetary awards; (c) some players may fail to register under the terms of the Settlement Agreement; and (d) some players may opt out of the Settlement.

(f) **Inflation Rate.** Because the monetary payouts are inflation-adjusted, we were required to make an assumption regarding the average inflation rate that will be applied on an annual basis over the 65-year term of the Settlement. The Parties agreed in the Settlement Agreement that the annual inflation factor may not exceed 2.50% and will be determined on an annual basis at the discretion of the Court or the Special Master. Given the likely volatility of the inflation rate over the 65-year period, we believe an assumed average rate of 2.00% is appropriate. Importantly, we anticipate that a significant portion of the total monetary awards will be paid out in the first three years of the Settlement term, which is highly likely to be a period of low inflation rates and also a short time horizon over which those inflation rates will be applied. We consulted an expert at Segal RogersCasey, Segal's investment consulting subsidiary, on this point. In determining the reasonableness of a 2.00% inflation assumption, he stochastically generated inflation rates over a 65-year time horizon, capping the annual rates at 2.50% as dictated by the Settlement Agreement. These rates were

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then applied to the expected Settlement payouts and under each iteration, a single rate was generated. The resulting rates were then averaged with a final average rate of 2.00%. These rates were generated using a proprietary model developed to reflect historical inflation rates with consideration of the current market as well as an outlook of future inflation.

(g) **Discount Rate.** Similarly, in determining the net present value of the Settlement, we made assumptions about the return that will be earned through conservative investments of the funding provided by the NFL Parties as well as an appropriate rate to apply to discount future values to present dollar values. Assuming a conservative investment portfolio comprised predominantly of municipal bonds, we have assumed a 4.5% rate of return that we project will be earned from the investment of the funds. We consulted an expert at Segal RogersCasey regarding this assumption, and he confirmed that it is a reasonable one.

42. We made the following assumptions about Offsets agreed to in the Settlement Agreement:

(a) **Eligible Seasons.** The Parties agreed in the Settlement to Offsets based on the number of Eligible Seasons earned by the retired NFL players. We have applied those Eligible Seasons Offsets and did not make any independent assumptions regarding those Offsets.

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Count of Retired Players by Credited Seasons

Service	Count
0	804
1	5,486
2	2,858
3	1,961
4	1,596
5	1,484
6	1,233
7	1,032
8	931
9	829
10+	2,340
Total	20,554

(b) **Age at diagnosis.** The Parties agreed to a Monetary Award Grid that makes adjustments to the monetary awards depending on the age at which players are diagnosed with the various Qualifying Diagnoses. We have applied that Grid based on the age data we had and assumptions we made (*see supra* ¶ []), and did not make any independent assumptions regarding the Grid.

(c) **Pre-2006 Decedents.** In Section 6.2 of the Settlement Agreement, the Parties agreed that the Representative Claimants of deceased Retired NFL Football Players who died before January 1, 2006 would be ineligible for monetary payouts unless the Court determines that a wrongful death or survival claim filed by the Representative Claimant would not be barred by the statute of limitations under applicable state law. Counsel instructed us to assume

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that 50% of pre-2006 decedents will be able to make such a showing with the Court and to assume that 50% of pre-2006 decedents will be ineligible for monetary awards through the MAF. We understand from counsel that this is a conservative assumption.

(d) **Stroke Offset.** The Parties agreed to a 75% Offset for players who are medically diagnosed with a stroke prior to their Qualifying Diagnoses. We applied that Offset without making any independent assumptions. However, we did make assumptions regarding the rate at which players will suffer strokes prior to their Qualifying Diagnoses. In order to do so, we reviewed relevant epidemiology. According to the Centers for Disease Control ("CDC"), the rate of stroke in the United States among people ages 65 or older was 8.3% in 2010 and increasing. Furthermore, the same data showed that the rate of stroke was slightly higher among males. This data led us to feel comfortable using an assumption of 9% for stroke among the NFL retired player population. However, the CDC does not provide data regarding the rate of stroke before dementia versus stroke after the onset of dementia, as the two comorbid conditions often occur in parallel. Thus we assumed that 50% of the time (or 4.5% overall) the stroke would occur after the onset of dementia and would not be subject to the 75% Offset.

(e) **Traumatic Brain Injury Offset.** The Parties agreed to a 75% Offset for players who are medically diagnosed with a traumatic brain injury ("TBI") prior to their Qualifying Diagnoses. We applied that Offset without making any independent assumptions. However, we did make assumptions

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regarding the rate at which players will suffer traumatic brain injuries prior to their Qualifying Diagnoses. According to the CDC, approximately 0.34% of the U.S. population suffers a traumatic brain injury each year. We then multiplied this by 35 years, which is the estimated average remaining years of life for retired players, to get a rate over that time of 12%. We then increased this rate by 17% because the same study found that males are 1.4 times more likely to have a stroke than females, for a rate of 14% throughout the remaining portion of their lifetime. We next reduced that by roughly half because the study's definition of TBI appears to be broader than the TBI definition in the Settlement agreement. Finally, because the CDC does not provide data as to the rate of TBI before dementia versus TBI after onset of dementia, we assumed that approximately 50% of the time (or 4% overall) the TBI would occur after the onset of dementia and not be subject to the 75% Offset.

(f) **Not participating in BAP.** The Parties agreed to a 10% Offset for certain players based on non-participation in the BAP, except where the Qualifying Diagnosis is of ALS or the player receives a Qualifying Diagnosis prior to his deadline to receive a baseline examination in the BAP. We applied that Offset without making any independent assumptions. Our assumption regarding the number of class members who will participate in the BAP is explained in paragraph 51 below.

G. Administrative Costs

43. Of the \$675 million dedicated to the MAF, we have assumed that \$10 million will be used for administrative costs based on rates provided to us by plaintiffs' counsel that were negotiated with the proposed Claims Administrator, Brown

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Greer. Thus, we have assumed that \$665 million is available for monetary awards over the term of the Settlement. We have assumed that the \$10 million will be paid out of the fund proportionally to the payout of the benefits. On a net present value basis, the \$10 million is determined to be worth \$6 million.

H. Stochastic Approach

44. After developing the assumptions described above, we randomly assigned them to individual players in the class using a stochastic approach. For example, we assumed that 95% of plaintiffs will participate in the Settlement. In applying this assumption, each individual plaintiff had a 95% chance of being deemed to have participated in the Settlement in each iteration of the model. We ran the model in 100 iterations and developed monetary projections to determine an average net present value of the payouts projected for the MAF.

45. In this case, the purpose of using a stochastic approach, which is a well-established statistical concept, is to run numerous iterations of the model to determine the expected value and the standard deviation of the expected payouts under the MAF. The approach provides us with a confidence interval surrounding the net present value results generated by the model, *i.e.*, a range of values in which we are 95% confident that the actual payouts under the MAF will fall. A stochastic approach is best practice in this instance because we cannot specifically apply the various assumptions described above to each specific player with certainty. *See generally* Clare Bellis *et al.*, *Understanding Actuarial Management: The Actuarial Control Cycle* 157-58 (1st ed. 2003). For example, if we only had ten players in our database and projected that one would develop Alzheimer's and another ALS, we could not determine which specific players would develop each condition, nor could we determine at what age each player

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would develop the disease. In this case, however, it would make a difference which two players developed the conditions, because different players played different amounts of time in the NFL and therefore are subject to varying Offsets. Moreover, for example, we would not know how many Eligible Seasons the Alzheimer's player had versus the ALS player, or whether the player will participate in the Settlement or the BAP. Finally, the age at which each condition is diagnosed impacts the monetary award to each player based on the tiered structure of the Grid. The stochastic approach allows us to apply the assumptions in an iterative manner that provides an educated forecast of the net present value and the confidence interval around that value based on our assumptions.

IV. RESULTS

A. Prevalence Projections and Net Present Value of Grid

46. As discussed above, under the stochastic approach we utilized in our model, we have averaged the prevalence projections generated by the model. Those final, averaged results showing incidence by age band and final prevalence are as follows:

Age Scatter of Final Incidence Projection

Age	Level 1.5	Level 2 ²³	ALS	CTE	Total
Under 45	3	54	5	9	71
45 - 49	4	54	2	1	61
50 - 54	2	72	2	10	86
55 - 59	4	114	2	4	124
60 - 64	6	152	4	3	165
65 - 69	8	189	3	5	205
70 - 74	8	262	8	6	284
75 - 79	13	347	4	5	369
80 +	77	2,036	1	9	2,123
Total Prevalence	125	3,280	31	52	3,488

²³ Includes Level 2, Alzheimer's and Parkinson's.

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47. These incidence/prevalence projections are for the 12,500 players that we assume will participate in the Settlement.

48. Significantly, our model projects that 33% of the current plaintiff population (*i.e.*, 4,808) and 28% of the total group of players we project will participate in the Settlement (*i.e.*, 12,500) have or will develop some Qualifying Diagnosis during the 65-year term of the Settlement. These results validate that our assumptions are reasonable and conservative because when compared to prevalence rates among the general population, they are significantly higher. Moreover, as anticipated, the model determines that players will first be diagnosed with various Qualifying Diagnoses at a younger age than the general population, which is consistent with plaintiffs' allegations.

49. We project that the MAF will be required to fund, on a net present value basis, \$537 million in payouts over the life of the Settlement. Aside from the \$37.5 million contingency fund, which will not have to be used, we expect that there will be \$544 million available from the settlement funds to finance these payouts on a net present value basis. The settlement funds consist of \$533 million from funding dedicated solely to the MAF, plus an \$11 million projected surplus from the BAP.²⁴ Our conclusions regarding the sufficiency of funding for the MAF and our confidence interval surrounding the variability of the net present value are discussed in greater detail below.

²⁴ In considering the impact of the unidentified group of retired players who participated in training camps for NFL teams, but did not make a formal roster, we looked at the players in our model who had zero Eligible Seasons (which is how training camp players would be treated under the Settlement Agreement). On average, those players received \$750 per player (the awards were higher but this per player figure includes players who were not projected to receive awards). Thus, we have concluded that "training camp only" players will not materially impact the sufficiency of the fund and do not alter our analysis or conclusions. And although we are unable to identify this group of players, it also seems less likely in our view that such players will participate in the Settlement given their limited careers in the NFL and limited exposure to head trauma during their NFL careers.

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B. Baseline Assessment Program

50. The Parties have allocated a \$75 million capped fund to the BAP ("BAP Fund") and have further agreed that any excess funds from the BAP Fund at the termination of the BAP will roll over into the MAF. We conducted an analysis of the BAP Fund to determine whether we expect any funds to rollover into the MAF.

51. We have assumed that 75% of participants in the settlement will undergo a baseline examination through the BAP. We based this assumption on the following factors. First, participation in the BAP is not mandatory to become eligible for a monetary award. Although some players will be subject to a 10% reduction in their monetary awards for lack of participation, players nevertheless would be eligible to receive awards simply by registering for the Settlement online within the agreed time period, even without participating in the BAP. Second, deceased players and players who currently have Qualifying Diagnoses need not participate in the BAP to receive their monetary awards. Third, some players in our database are ineligible to participate in the BAP based on the Settlement Agreement, which requires that a player have accrued at least half of an eligible season to participate in the BAP. Finally, younger, asymptomatic players may feel it is unnecessary to undergo neuropsychological and neurological testing if they are not exhibiting any signs of impairment today. Thus, players may not take advantage of the testing being provided under the Settlement even if they later choose to participate in the Settlement to become eligible for monetary awards if their conditions deteriorate. We therefore think the 75% rate is a conservative assumption. This assumption results in a projection of 8,700 players participating in the BAP.

52. We have been informed by plaintiffs' counsel that they have negotiated a rate of \$3,200 for each baseline examination through the BAP. Using this

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rate, we anticipate that the baseline examinations will cost \$28 million (\$25 million on a net present value basis).

53. Using plaintiffs' sample data, we also projected the number of players that would qualify for Level 1 (moderate cognitive impairment). We used the same overall process described above in generating current prevalence rates of the Qualifying Diagnoses within the population of approximately 1,500 plaintiffs in the sample data file. However, because Level 1 is a less severe condition, we placed players with fewer reported symptoms in Level 1. We assumed that 50% of players with at least five diagnosed symptoms, or who reported "Neuro-cognitive diagnosed", would be in Level 1. We also accounted for the fact that we expect players projected to develop Level 1.5, Level 2, Alzheimer's or Parkinson's in the future to first pass through Level 1. In total, we estimate that about 750 players will be diagnosed with Level 1 during the first ten years of the settlement—the period agreed to by the parties in the Settlement Agreement.

54. We have been instructed to assume that, for players diagnosed with a Level 1 diagnosis, the cost of further testing, treatment, and related drug therapy would not exceed \$35,000 per player. We assumed that every player that we project will be diagnosed with Level 1 impairment will be provided with the maximum amount of benefits, even though many players participating in the program are not likely to require benefits at this maximum level, which we consider another conservative assumption within the parameters we were given. The total payouts are expected to be \$27 million (\$20 million on a net present value basis).

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55. We have been informed by plaintiffs' counsel that they have negotiated administrative costs totaling \$7 million over the term of the BAP (\$6 million on a net present value basis), including the additional five-year period during which players may continue to receive supplemental benefits depending on the date of their diagnoses.

56. Our model projects costs of \$62 million to fund exams, provide supplemental benefits, and pay administrative costs over the term of the BAP. The funding requirements for the BAP contained in the Settlement Agreement call for an initial contribution in year one of \$35 million, plus additional funding to be added to the BAP whenever the balance of the fund dedicated to the BAP drops below \$10 million. We project that \$30 million in funding will need to be added to the initial \$35 million being deposited into the BAP fund over the ten-year period of the BAP. This results in total funding into the BAP of \$65 million, which has an NPV of \$56 million. At the end of the BAP's 10-year term and 5-year run out period for supplemental benefits, we project an ending balance of \$9 million that will never be used to cover the exams, supplemental benefits, and administrative costs of the BAP (per the funding requirement above). This unused balance of \$9 million, based on the cash flow of that \$9 million, has an NPV of \$5.5 million that will rollover into the MAF.

57. In addition, the Settlement Agreement sets aside \$75 million for the BAP overall. However, as noted above, we only project that \$65 million will need to be placed into the BAP fund over the term of the BAP. Thus, another \$10 million will be available at the end of the BAP and will rollover into the MAF. This unused allocation of \$10 million has an NPV of \$5.5 million.

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58. Therefore, we project the ending balance from the BAP fund (NPV \$5.5 million), plus the unused portion of the \$75 million allocated to the BAP (NPV of \$5.5 million) will combine to create an \$11 million total rollover into the MAF. The details of the cash flow associated with our calculations are provided in Exhibit [].

C. Cash Flow Analysis

59. In order to verify the monetary sufficiency of the Settlement on an “as needed” basis, we also conducted a cash flow analysis to determine the sufficiency of the fund on an annual basis. The funding schedule is set forth in Article XXIII of the Settlement Agreement. In addition to determining the sufficiency of the fund on an annual basis to generate necessary payouts, we further took account of the requirement that the MAF is required to maintain a balance of \$50 million at all times in accordance with section 23.4 of the Settlement Agreement.

60. Our model generally projects payments into the fund as of the beginning of each year based on the terms of the Settlement Agreement, while payments out of the funds are generally assumed to be paid mid-year based on the fact that players will be diagnosed and will submit claims throughout each annual year. Our model projects a large number of claims for individuals diagnosed prior to or within the first few years of the Settlement, and, as such, we conducted a more detailed analysis of the cash flow timing to determine whether any additional funding would be necessary over that period. Based on the administrative processes at the beginning of the Settlement, we assumed that the monetary awards to players during the first three years would be paid out on a monthly basis as follows:

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(a) Roughly half of the projected first-year claims will be for players who have a current, hard-coded Qualifying Diagnosis. These payments were assumed to be paid six months from the Effective Date of the Settlement.

(b) Roughly 30% of the projected first-year claims will be for players who are currently plaintiffs without a hard-coded Qualifying Diagnosis. These payments were assumed to be paid evenly over an 18-month period beginning six months from the settlement date.

(c) The remaining roughly 20% of the projected first-year claims will be for players who are not currently plaintiffs and do not have a hard-coded Qualifying Diagnosis. These payments were assumed to be paid evenly over a 24-month period beginning twelve months from the Effective Date of the Settlement.

(d) Estimated payments for years two and three were assumed to be paid evenly throughout the year.

61. Our cash flow analysis is attached as Exhibit E to this Report. Overall, we conclude that the MAF will be sufficiently funded on an annual basis to pay monetary awards to qualifying class members. Finally, we do not believe the MAF will need to be pre-funded at any point pursuant to the requirement that the NFL Parties maintain a minimum balance of \$50 million in the MAF.

V. CONCLUSIONS

62. We developed an actuarial model that accounts for the various factors arising out of the Settlement Agreement. In building this model, we made informed, conservative assumptions designed to determine the sufficiency of the Settlement and used statistical and actuarial methods to validate its sufficiency. The

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assumptions are reasonable and conservative individually and in aggregate. We took a conservative approach in developing our assumptions by seeking to err on the side of overstating the number of players who will develop Qualifying Diagnoses and by seeking to err on the side of projecting the development of the Qualifying Diagnoses at earlier ages. Thus, our goal was to project more monetary payments at higher values to retired players than may otherwise be expected to occur over the term of the Settlement. We did so in order to better test the sufficiency of the fund.

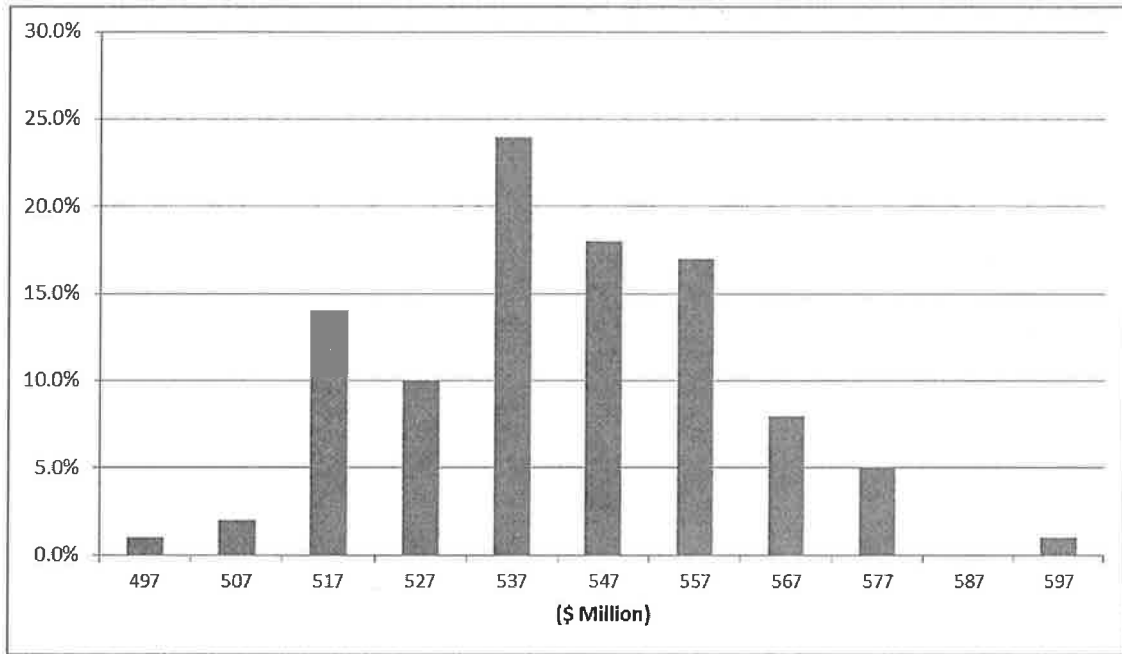
63. **BAP**. The \$75 million BAP Fund is sufficiently funded, and we expect \$11 million to be available on a net present value basis to further fund the MAF pursuant to Section 5.14 of the Settlement Agreement.

64. **MAF**. The Grid agreed to by the Parties in the Settlement Agreement will result in monetary awards to players totaling \$900 million on a nominal basis. This requires funding with a net present value of \$537 million to pay out the monetary awards that we anticipate will occur over the life of the Settlement. We believe that there is \$544 million available on a net present value basis between the funding dedicated to the MAF (\$533 million) and the rollover from the BAP (\$11 million) to pay the monetary awards. Thus, we project a cushion of \$7 million built into the Settlement—*without consideration of the \$37.5 million contingency fund*.

65. Our stochastic approach, based on the conservative assumptions described in this Report, generated a mean value of expected future benefits over the life of the Settlement of \$537 million, and a standard deviation of \$19 million. The summary of our results are as follows:

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Summary of Results (100 Runs)



66. As shown in the charts above and below, the distribution of the results approximates a normal distribution such that the 95% confidence interval around the mean is +/- \$37 million.²⁵ In other words, the chances of the total monetary awards over the life of the Settlement being outside of the confidence interval of \$500 million to \$574 million are five percent. And even if the actual monetary awards reach the top end of the confidence interval, *i.e.*, \$574 million, the \$37.5 million contingency fund would be available.

²⁵ The bell-curve distribution of results is consistent with statistical norms. In developing the model, we tested the distribution of results for 1,000 iterations to confirm that results are statistically normal. Further, the additional iterations had a *de minimus* impact on the mean and standard deviation of the results.

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Confidence Interval of Net Present Value of Payout

	Bottom (2.5%) Interval	Mean	Upper (2.5%) Interval
NPV of MAF	\$500,000,000	\$537,000,000	\$574,000,000
NPV of BAP	51,000,000	51,000,000	51,000,000
NPV of Admin Cost	6,000,000	6,000,000	6,000,000
NPV of Total Payout	557,000,000	594,000,000	631,000,000
NPV of Settlement Fund	601,000,000	601,000,000	601,000,000
Cushion/(Shortfall)	\$44,000,000	\$7,000,000	\$(30,000,000)

Ninety-five percent of potential outcomes are expected to fall within this range, meaning that only 2.5% are expected to fall below the bottom interval while 97.5% are expected to fall below the upper interval.

67. Overall, based on our model and the conservative assumptions described in our Report, we are confident that there is sufficient funding in the Settlement to compensate all eligible and qualified class members who will develop Qualifying Diagnoses during the 65-year term of the Settlement.

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APPENDIX A

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APPENDIX B

The underlying incidence rate assumptions within the model implicitly reflect an assumption regarding mortality. As an additional reasonability analysis, we considered the impact of an explicit mortality assumption in the form of a multiple decrement schedule in place of the progression methods and assumptions described in our Report.

As part of this analysis, we isolated the projected award payouts that are subject to the progression assumptions in the model (*i.e.*, the 25% of individuals assumed to progress from being asymptomatic to Level 1.5 or Level 2), grouping the liabilities by five-year age cohorts beginning at age 30 going through age 90.

Next, we selected sample lives for each starting age (*i.e.*, current age as of January 1, 2013) in five-year increments consistent with the five-year age cohorts. We then calculated the expected net present value of the projected award payouts for these sample lives using the same methods and assumptions used in the model, as well as under a multiple decrement schedule that reflects incidence and mortality rates for each age.¹

Finally, we calculated the ratio of the net present value under both modeling approaches for each sample life and multiplied the expected award payouts by that ratio for each cohort. Overall, the results of our analysis, when considering mortality explicitly, reduced the net present value of the expected award payouts by approximately \$7 million (roughly one-third of a standard deviation of the total net present value that is produced by the model as documented in this Report).

The incidence rates for the multiple decrement schedule were developed by adjusting the assumed incidence rates in the model to reflect the portion of the population that is expected to survive to each age. We conducted this analysis utilizing the RP2000 combined mortality table projected 20 years (same as used by the player's pension valuation actuary).

In order to further consider the potential impact of mortality, we then modeled an increased mortality improvement assumption using the RP2000 combined mortality table with generational projection using scale AA. The result of the improved mortality assumption is an increase to the net present value of approximately \$7 million when compared to results using the RP2000 combined table projected 20 years, thereby offsetting the \$7 million reduction for this alternative methodology. As such, this reasonability test confirms to us that our modeling is reasonable and that our methodology is appropriate.

¹ Analysis of the sample lives was limited to the progression related assumptions (*i.e.*, progression, incidence and mortality), as well as the award grid and inflation and discount rate assumptions.